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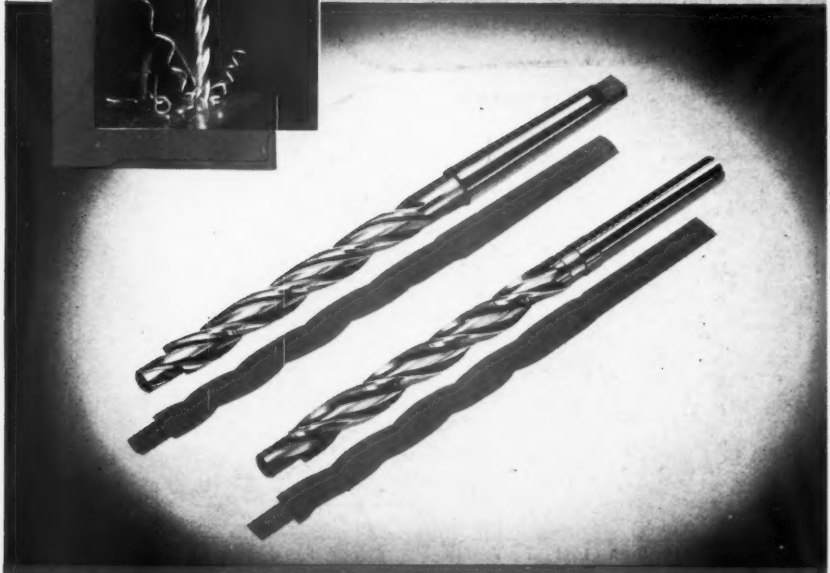

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Editor George J. Huebner

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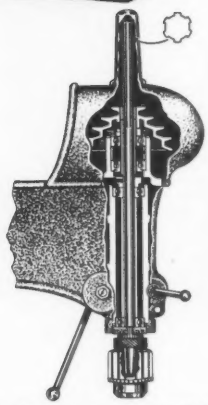

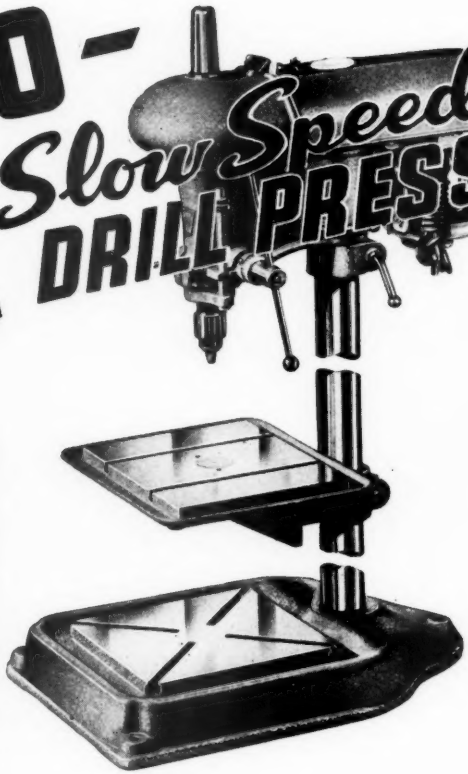

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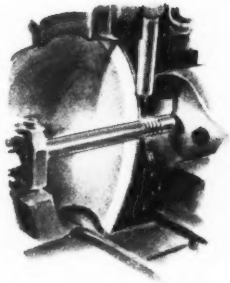

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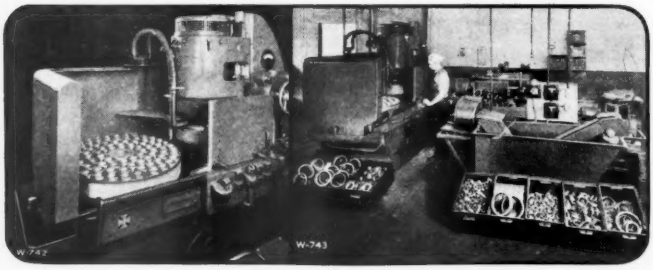

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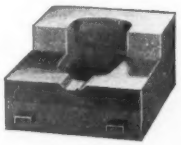

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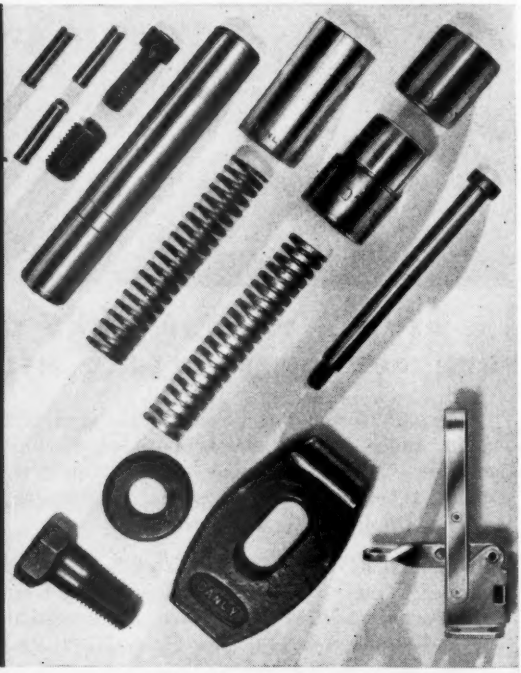

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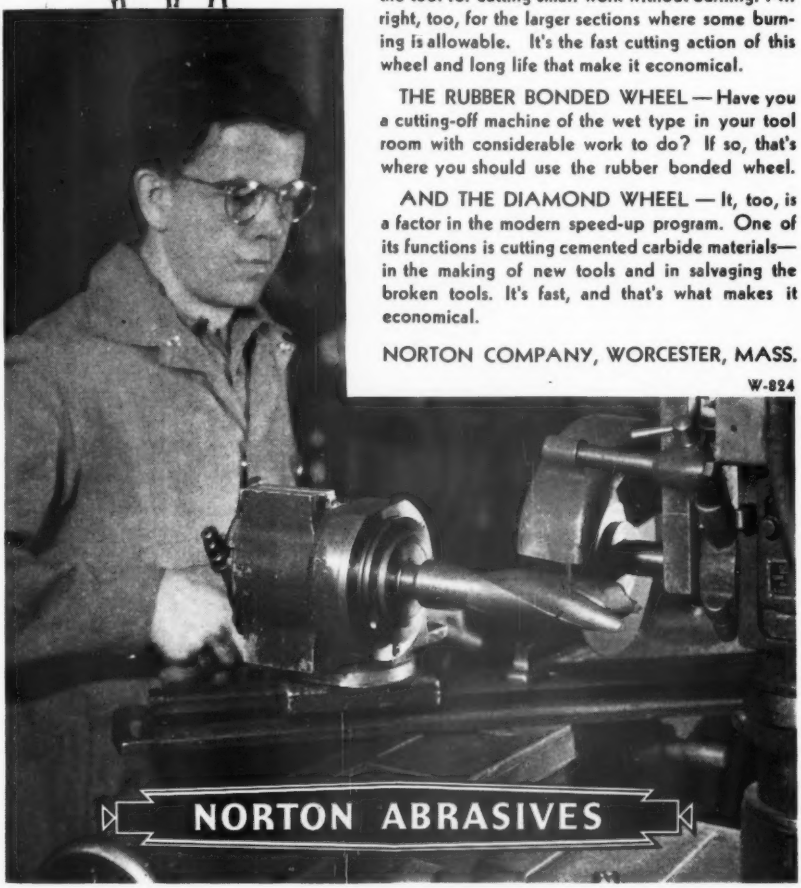

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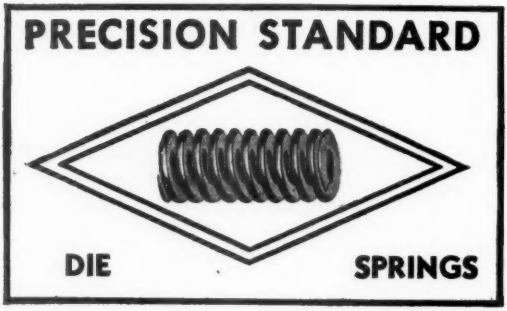

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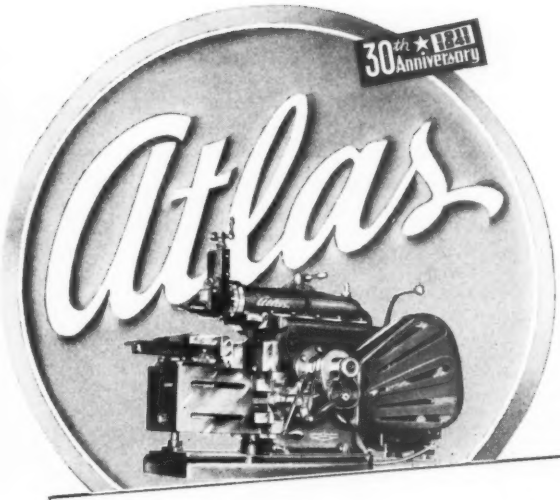

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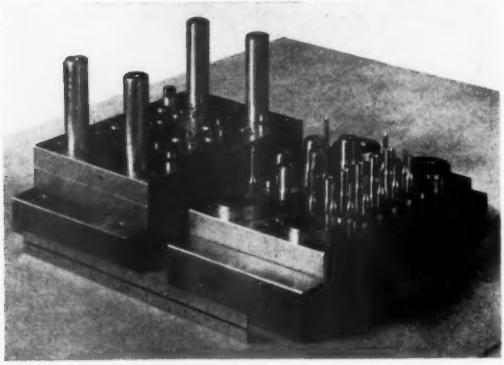

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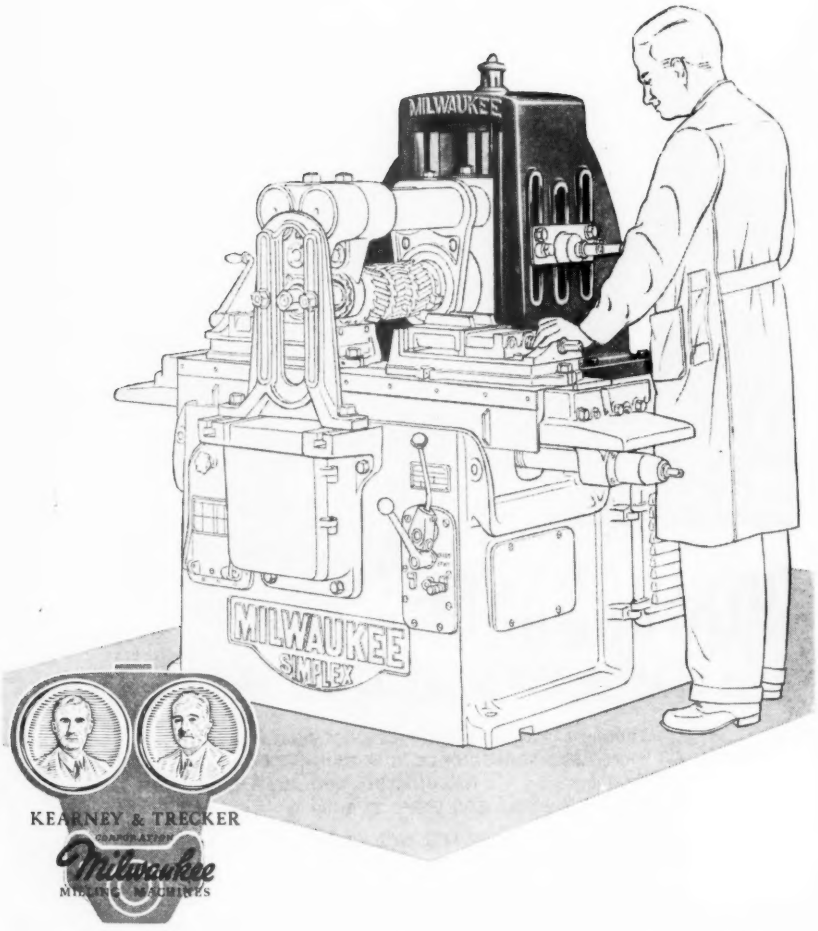

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The TOOL and DIE Journal

TOOL–DIE–MACHINE PROGRESS

JULY, 1941 Vol. 7, No. 4

A **Reader Requested** Article

An Alternate Design for a Typical Ejector Pin Mold

By Thomas J. Lester

The ejector type design discussed in this article is an alternate design for the ejector pin injection mold for an ink bottle cap which appears in Chapter V of Gordon B. Thayer's "Plastics Mold Designing". This design, together with a stripper type design for the same mold which will be the subject of a subsequent article, suggests the range of design possibilities for even a comparatively simple injection mold. These designs have been prepared at the specific request of a number of our readers.

Thomas J. Lester, who prepared the two alternate designs, is a plastics mold and die casting engineer with the Lester Engineering Company.

—The Editor.

EVERY designer of plastics molds keeps three factors or elements in mind, consciously or unconsciously, as he proceeds with a design. The first is the design of the finished part or casting; the second is the skill and the equipment of the men who will actually make the mold; the third factor is the experience or preference of the designer himself. Obviously, there are occasions when one or other of the factors will be of more importance than others.

The alternate designs to be reviewed are not exceptions. The fact that the shop which was to build the molds had better than usual lathe operators with adequate lathe and surface grinding equipment available was naturally taken into consideration. It is also logical that any designer will lean toward features of design which have proven successful in practice.

Another element which influences design, and which will become more and more important as many grades of steel become more difficult to secure, is economy of design to conserve metal. This will include designs which will be practical with second or third choice of metals when the first choice is not available.

The mold illustrated (Page 21) is an ejector type. The distinction between an ejector type mold and a stripper type is that the ejector type is designed so that as the mold opens the shot or casting is pushed out of the cavity or off protruding parts, cores, pins, etc. The stripper type is designed with a stripper plate which rides or is pushed over all protruding parts and which carries the casting along to clear the projecting cores. This distinction will be made clear in the examples which follow.

It will be noted in the first mold

(Figs. 1, 2, 3) that all the main parts are round and could be machined on a lathe—both in diameter and thickness—and of course, be later ground for accuracy and parallelism.

Details 9, 19, 20, 21 and 22 make up the injection or cover half assembly of the mold. This mold half is clamped to the stationary mounting plate of the molding machine and the slot or groove (detail 3) is provided for this purpose.

The ejector mold half consists of the following parts—details 2, 4, 5, 6, 7, 12, 13, 15, 16, 17 and 18. This mold half assembly is fastened to the movable mounting plate of the machine in a manner similar to the injection or cover mold half. In both cases a register (detail 11) is provided to facilitate mold setup in the molding machine.

To understand the construction of this mold design, let us follow the plastics material from the time it enters the mold until the mold is opened and the casting removed. The plasticized material enters through the tapered hole in the sprue bushing (detail 22) toward the sprue pin (detail 5) and is directed to the six cavities (cavity insert, detail 20) by runners or gating (detail 23). At the completion of the cooling period (detail 8 shows one of the water lines), the mold is opened or parted where the core and cavity retainer plates meet (details 6 and 19). The molded shot or casting will shrink to the raised cores of the core inserts (detail 17) and the sprue will be pulled from the sprue bushing due to the undercut on the sprue pin.

How Ejector Rods Function

Several types of injection molding machines are equipped with adjustable ejector rods which operate essentially as follows: Assume the machine opens eight inches and the casting must be pushed out of a one-inch cavity or off a one-inch core. When seven inches of the movement is accomplished the ejector rod will strike the ejector plate (detail 12). The ejector rod itself is detail 1. If the plate travels in the parting line direction, the ejector pins (detail 16) will lift the casting off the raised cores, the sprue pin (detail 5) will protrude from the core retainer plate, and the casting will be free to fall or to be moved from the mold. Surface or push back pins (detail 7) will be pushed out of the ejector mold half in the same manner as the sprue and ejector pins. The surface pins push the ejector plates along with the ejector pins back into the molding position by contact with plate 19 as the mold closes.

The ejector box (detail 2) can be of cast iron, burned out of machine steel or machined out of the solid. The latter method is rather costly and sometimes wasteful if the ejector box is deep. The box is lathe machined and later finished by grinding the surface that fits against the core retainer plate. The box is fastened by four socket head screws through a clearance drilled hole in the core backing plate into tapped holes in the core retainer plate (detail 6). In many cases the ejector plates (details 12 and 13) are cold rolled steel—the ejector pin retainer plate (detail 13) is drilled first for all holes. The holes are countersunk to provide for peening on the drill rod pins (peened before hardening). The ejector pin retainer plate is then fastened to the knockout side of the ejector plate. The plates can be machined together. Ample clearance all around should be allowed for the plates where they fit into the ejector box bore.

The core insert back-up plate (detail 15) in this case is specified to be made of alloy steel to provide resistance to sinking of the cores in service. This plate is lathe machined and ground on both sides. All pin holes are clearance drilled with the exception of the sprue and surface pins—these should be lapped fits. Four socket head screws (detail 27) extend through this plate into the core retainer plate (detail 6). Some molders believe that it is advantageous to place socket head screws close to the inserts to prevent molding carbon, formed by gases present in molding, from forming under the cavity inserts, thus assuring a cleaner and more positive mold.

The boring of insert retainer holes in the core and cavity retainer plates (details 6 and 19) must be done carefully; guide pin bushing and sprue pin hole must also be bored carefully since mating core and cavity inserts (details 17 and 20) are mitred or matched before assembly and ground for parallelism. The guide pin bushings (detail 18) are press fitted in this core retainer plate (detail 6). The guide pins (detail 21)

Principal Parts

1. Ejector rod
2. Ejector box
3. Slot or groove
4. Ejector box support
5. Sprue pin
6. Core retainer plate
7. Surface or push back pin
8. Water hole
9. Cavity insert back-up plate
10. Cavity retainer plate screw
11. Register
12. Ejector plate
13. Ejector pin retainer plate
14. Space for ejector plate travel
15. Core insert back-up plate
16. Ejector pin
17. Core insert
18. Guide pin bushing
19. Cavity retainer plate
20. Cavity insert
21. Guide pin
22. Sprue bushing
23. Runners and gating
24. Water line, inlet
25. Water line, outlet
26. Ejector box assembly screw
27. Core back-up plate screw

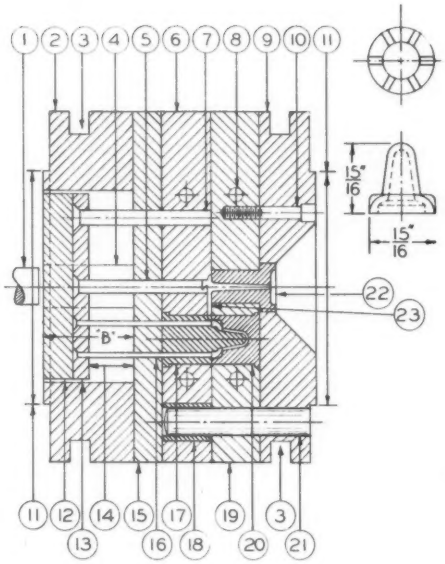
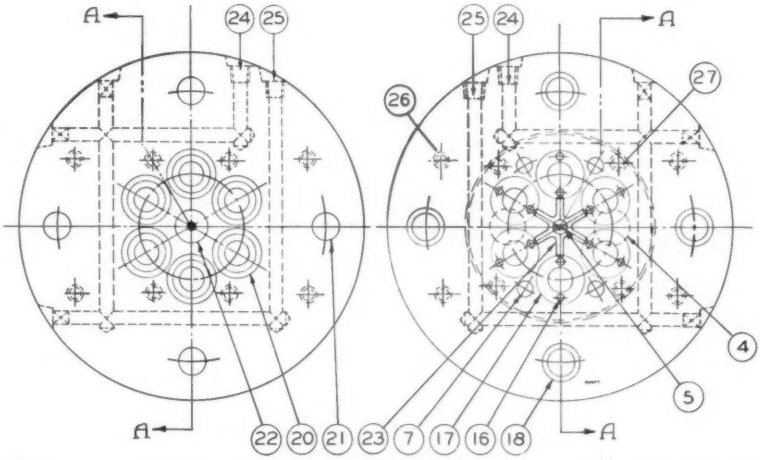


Fig. 1, right — sectional elevation.

Fig. 2, below, left — view facing injection half.

Fig. 3, below, right — view facing ejector half.



are press fitted in cavity insert retainer and cavity back-up plates. The cavity insert back-up plate is made of alloy steel, lathe machined as is its counterpart, the core insert backing plate.

Changeable Inserts

This mold is designed so the cavity and core inserts may be removed after the ink bottle job run is completed. Thus a fully constructed holder mold or mold shoe is left for future use and a variety of inserts of the same diameter and height may be installed therein. This feature is particularly valuable to the

(Continued on Page 42)

Problems of Die Casting Die Design

By Alfred E. Holder
Die Casting Division
Cleveland Hardware & Forging Co.

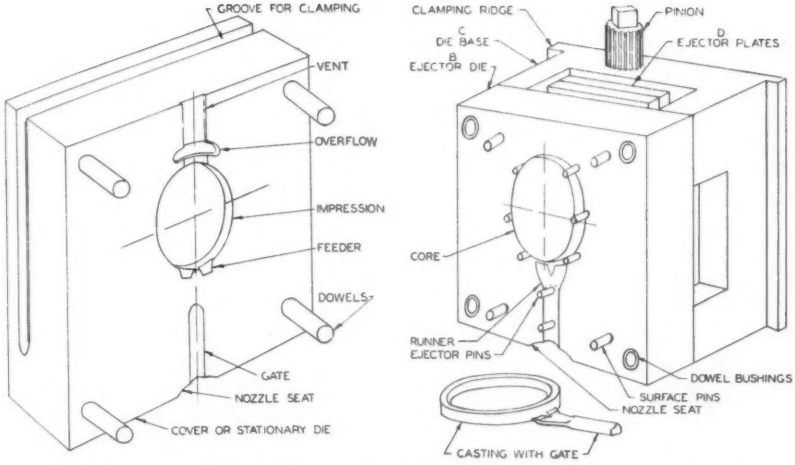
THE die casting die is a production tool of high accuracy. Despite the extremely severe conditions under which it works, it must produce castings of uniform quality capable of meeting the most rigid requirements of interchangeability. The design of die casting dies requires a high degree of skill that comes only with daily experience with casting problems.

The temperature of the die in making zinc die castings is between 400 and 450 F. For aluminum die castings the working temperature is approximately 600 F. The combinations of heat, pressure and abrasive action of fast moving metal (aluminum has another factor, the affinity of aluminum for steel) are the ever present "enemies" that cause cores to break, slides to stick, gates to wash out, ejector pins to bend, impressions to solder up, castings to stick—in short cause all sorts of production breakdowns and the final end of the die itself. The conscientious die caster will always keep a jump ahead of himself trying to avoid such difficulties.

Since it is axiomatic that no product can be better than the tools which produce it, die casting dies literally require that skill be frozen into the steel of the mold. Since liquid metal works into the minutest crevices in the cavity so closely that the first castings will have even the faintest scratches of the fine emery used to finish the mold, accuracy is absolutely essential. Inaccuracies have a tendency to increase, especially if the discrepancy is located across the parting line of the two die halves or is caused by any other movable parts as cores, slides, loose pieces, etc., which tend to produce dimensional variation in the casting.

The principle of the die casting die is very simple. To illustrate the main components of the die we refer to Figs. 1 and 2 which show the die elements for a simple ring. These two drawings show the three major parts which make up any die casting die. Fig. 1 shows the cover die or stationary die. The cover die forms the outside and the top face of the casting. It is held against the stationary plate of the die casting machine by means of screws in the back, or more often by clamps which grip the die in a groove (Fig. 1) which is cut around the outside edge of the die. "B" in Fig. 2 is the movable or ejector die containing the core (stationary in this case) which forms the inside of the casting. The die face forms the bottom face of the casting. Built together with the ejector die is "C", the die base or ejector base which contains "D", the ejector plates.

The ejector die and base are bolted and doweled together and are fastened as a unit on the movable platen of the machine, either by bolts or clamps (Fig. 3) the same as the cover die. The ejector plates are movable either by racks and pinions, or by ejecting mechanisms provided on the die casting machine. The pinion itself can be moved, either by hand or may be tied up with the movement of the machine to provide automatic ejection at the end of the opening stroke of the machine. The ejector pins are fastened to the ejector plates (Fig. 3). Their purpose, as the name implies, is to push the casting off the core onto which it shrank. This shrinking on the core itself is utilized in the die to pull the casting out of the cover die when the die is opened after the shot. Fastened



Figs. 1 and 2. Fig. 1, left, shows the cover or stationary die. The gate, nozzle seat, feeder, overflow and vent are typical. This half of the die is held against the stationary plate of the die casting machine by clamps. Fig. 2, right, shows the movable or ejector die "B", the die or ejector base "C", and the ejector plates "D". A casting with the gate still attached is shown below.

in the ejector plates also are usually four safety or surface pins (Fig. 2), which by touching the face of the cover die in closing the die insure that the ejector plates, and with them the ejector pins, are completely home against stops (Fig. 3) provided for this purpose. Dowel pins, also usually four, secure the alignment of the two die halves. The two top surfaces on the cover and ejector half form the parting line on the casting.

If the die is used on a splitgate or sideshot machine the gate is usually half and half in the two die halves (see Figs. 1, 2 and 4) with a nozzle seat on one side of the die (Fig. 4). For a centershot machine the sprue hole (Fig. 5) is a tapered hole (usually from 10° to 20° included angle) with the taper hole through the cover die half with the nozzle seat on the back of the cover die. In the ejector half a gate post or sprue cutter is provided which serves several purposes. First the metal will shrink around this gate post in the same manner as it would shrink to a core, so that as the die opens the sprue is pulled away from the nozzle and out of the sprue hole. It also reduces the amount of metal in the sprue, which together with the water cooling provided in the gate post, as well as around the sprue hole, cuts down the time it takes for the metal in the sprue to freeze. Some die casters also consider it helpful to lead the incoming metal around the 90 degree bend towards the impression without splattering directly against the flat face of the die.

Materials for Die Casting Dies

All die casting dies whether for lead, zinc, aluminum, magnesium, or brass have these basic parts. The principal difference between dies for die casting materials with a low melting point as tin, lead, and zinc, and those with a high melting point as aluminum, magnesium, and brass is in the type of steel used. A good grade of machine steel, or low carbon steel—between .30 and .50 percent—will stand up satisfactorily for the low melting point group of die casting metals. The advisable carbon content increases with the melting point of the casting alloy. For aluminum and magnesium a tungsten-chromium, or molybdenum-chromium alloy steel is generally used.

Dies for the high melting point materials are heat treated and hardened, which makes changes after the die is completed costly; welding on the die is not recommended, although it is done frequently.

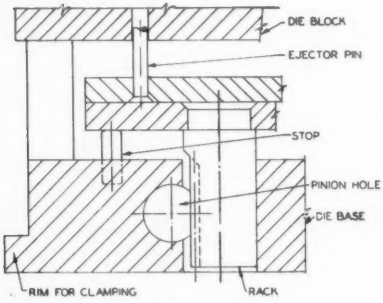


Fig. 3

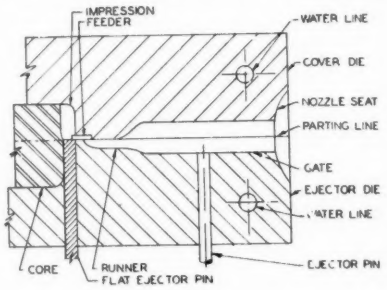


Fig. 4

Fig. 3, left, In this design the standard practice of fastening ejector pins to the ejector plate and the rack and pinion type of mechanism for ejection is illustrated. In this view the ejector plate is "home" against the stop.

Fig. 4, right, This sideshot or splitgate arrangement shows a typical design for gate, water lines and ejector pins. The flat ejector pin is used to prevent cracking the die. Drilling a round hole close to the cored out section would leave a weak section in the die that would crack.

Dies for the low melting point alloys are as a rule not heat treated, except cores and slides which should be case hardened to give better wearing conditions. Changes on these dies are more easily made and welding is not so much a hazard as on hardened dies.

Some die casters heat treat and harden dies used for zinc alloys, but except for the fact that these dies are not so easily nicked or the edges of the impression peened over, or if the impression is very intricate and costly to produce, the die life in general is satisfactory without this extra precaution. The life of a die for zinc alloys can reasonably be figured to be between 250,000 and 500,000 pieces, and for aluminum alloys from 125,000 to 200,000. These figures are more or less dependent on the intricacy of the produced casting. A plain open and closing type with no moving parts in either die half, other than the ejector pins, will outlast a die which contains movable cores, slides and ejector sleeves (Fig. 6).

Decisions Required for Design

In considering the die design for a given part the following points come up, and have to be weighed against each other: Which is going to be the ejector side? Where is the parting line going to be? Is it necessary to provide side pulls, slides, or cores at right angle or any other angle to the direction of opening and closing of the die? These features raise both the initial cost of the die as well as its maintenance cost. How is the casting to be ejected from the ejector die, and how will the casting have to be gated and vented? Where will water lines have to be drilled to cool the gate and heavy sections of the casting to prevent shrink holes and bleeding—to keep the casting from bending and to prevent blisters and hot spots on the casting? How will shrinkage affect dimensions which have to be held close? Will any dimension with close tolerances be effected by reaching across the parting line, or by any other movable part of the die? Should holes be machined rather than cast, and where should machining stock be added for sizes which call for tolerances beyond the casting possibility? All of these con-

(Continued on Page 26)

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Problems of Die Casting Die Design

(Continued from Page 24)

siderations affect the design of the part to be cast.

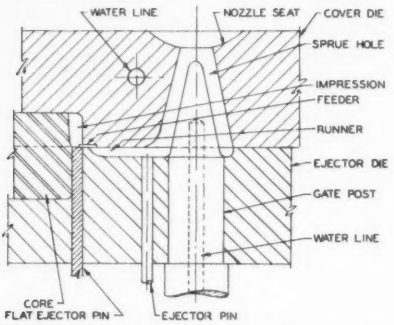

Fig. 5. This is a typical design of a centershot gate, showing nozzle seat, sprue hole and gate post. Water lines are provided in the cover die close to the nozzle seat — in order to cool both nozzle seat and gate or sprue. Ejector pins are used to push the gate off gate post.

From our general description of the die construction it is clear that a casting has to come out of the cover die in order to be ejected properly with the provided means by the ejector die. This ejection is usually accomplished by utilizing the shrinkage around a core or several smaller cores. Side cores, or slides, which are integral with the ejector die, and which are pulled out of the casting only after the die is opened will force the casting out of the cover die. Water lines drilled into the die block proper or into the cores help increase the shrinkage of the casting. In drilling water lines care has to be taken that they are placed close enough to cool the particular part of the die but do not cause the casting to crack; or if good finish is required on the casting the cooling should not cause "cold shots" or "flowers" to appear on the surface of the casting.

The position of the parting line is also an important design consideration. The flash of metal or "fins" at the parting line and the flashes and seams which appear wherever stationary or movable parts of the die are fitted together, must be removed or cleaned in a finishing operation. Ejector pins and ejector sleeves, which always leave impressions on the casting, in time will develop flashes, or "whiskers" as the die gets older. The ejector pins should be placed on parts of the casting so that marks are not objectionable to the customer; at the same time they will have to be arranged in such a way as to avoid bending or warping the casting in ejection.

Gating and venting of the casting are among the most difficult problems which confront the die caster. The proper place, as well as the proper amount, of gate and vent quite often spell the difference between a continuous headache and a good running die.

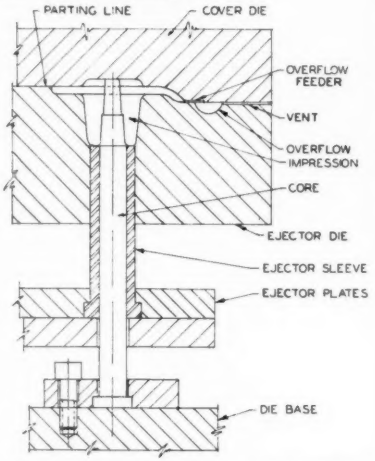

Fig. 6. An ejector sleeve arrangement is illustrated, such as is used around stationary core when neither round nor flat ejector pins are possible. The core is held stationary against the die base; the sleeve is fastened to ejector plates. The overflow is typical.

The gate itself is divided into two parts—the runners, which lead from the sprue close up to the casting, and the inlet into the impression itself which is usually called the "feeder" (Figs. 4 and 5). The runners take a wide variety of shapes and sizes; while the feeders vary in thickness from .020" on high pressure machines up to .060" on gooseneck or low pressure machines. It is usually not possible to set a standard rule for gating

(Continued on Page 52)

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A Reader Requested Article

Equipment and Operations Required for Making 75 to 105 MM Cartridge Cases

By William Reiff, Jr.

Cleveland Duplex Machinery Company

This is the companion article to "Manufacturing Process for 75-90-105 and 155 MM Shell," published in the April issue. This completes the series of four articles written for the tool room and die shop engaged or about to be engaged in ordnance part work.

—The Editor.

OPERATION No. 1	BLANK (from Coil Stock)
Equipment:	Mechanical Presses with automatic feeds.
OPERATION No. 2	CUPPING OF DISK
Equipment:	Mechanical or Hydraulic Presses at speed of 75 fpm.
	Cases up to 3″ dia.—150 Tons—20 SPM—16″ Stroke.
	Cases over 3″ dia.—400 Tons—15 SPM—16″ Stroke.
	(A dial-type press can be used, but is not essential.)
OPERATION No. 3	ANNEAL IN FURNACES
Operation:	Heat to 1150 F. Dip or spray with cold water.
OPERATION No. 4	PICKLE AND WASH
Equipment:	Washing and pickling machines.
Method:	12% H_2SO_4 solution, 170 F for 2½ minutes. Rinse in cold water; dip in warm soap solution (.2 per cent by weight of soap; chips .02 per cent by weight of alkaline cleaner); rinse in hot water.
OPERATION No. 5	FIRST REDRAW
Equipment:	Hydraulic Presses (dial feed if desired).
	Cases up to 3″ dia.—100 Tons—50 fpm—18″ Stroke.
	Alternate use, mechanical presses 20 SPM
	Cases over 3″ dia.—200 Tons—35 fpm—60″ Stroke.
	Speed—65 fpm.
OPERATION No. 6	Same as Operation No. 3.
OPERATION No. 7	Same as Operation No. 4.

(Continued on Page 30)

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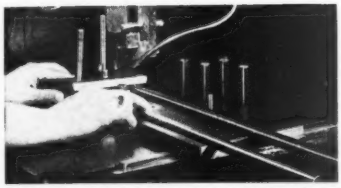
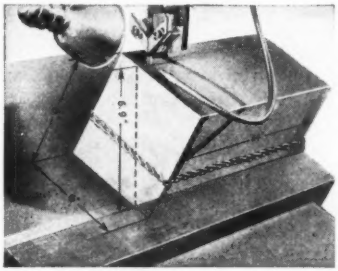
Aluminum, asbestos, Bakelite, brass, bronze, copper, cast iron, fiber, mica, Monel metal, nickel silver, porcelain, pipe, slate, zinc—any kind of steel, alloy, plastic, etc.

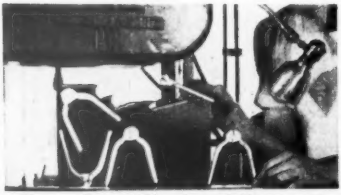


Pipe cut to accurate lengths with aid of simple attachment.

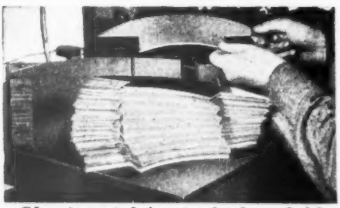


Steel block sawed in half on a 30° angle at the Swanson Tool & Machine Co., Erie, Pa.

30 minutes to saw off one side and cut notch in other side of hot rolled steel die parts. Speed, 150 f.p.m.



Type Bar Aligning Pliers cut from ⅜" cold rolled steel. 3 made in 1 hour with DOALL Saws. Former time, 16 hours.



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Equipment and Operations Required for making Cartridge Cases

(Continued from Page 28)

OPERATION No. 8 — **SECOND REDRAW**

Equipment: Hydraulic Presses (single station).
Cases up to 3″ dia.—90 Tons—45 fpm—40″ Stroke.
Cases over 3″ dia.—150 Tons—34 fpm—60″ Stroke.

OPERATION No. 9 — Same as Operation No. 3.

OPERATION No. 10 — Same as Operation No. 4.

OPERATION No. 11 — **THIRD AND FINAL REDRAW** (on cases up to 3″ dia.)

Equipment: Same as Operation 8 except:
Cases up to 3″ dia.—60 Tons—40 fpm—60″ Stroke.
Cases over 3″ dia.—125 Tons—35 fpm—60″ Stroke.

OPERATION No. 11A — **FOURTH AND FINAL REDRAW** (on cases over 3″ dia.)

Equipment: 75 Ton Hydraulic Presses—35 fpm—80″ Stroke.

All presses mentioned above, with the exception of those used for Operation No. 1, should have forced feed die lubrication. Carbide insert dies are used due to severe reductions. More draw operations can be employed if carbide dies are not used, but this increases cost rapidly due to extra annealing, pickling and washing required.

OPERATION No. 12 — **FIRST TRIM** (prior to tapering)

Equipment: Large spindle collet machines. Special machines are available.

OPERATION No. 13 — **HEAD AND INDENT**

Equipment: Mechanical and Hydraulic Presses (6 station dial feed may be used).
Cases up to 3″ dia.—640 Tons*—30 SPM—6″ Stroke.
Cases over 3″ dia.—3300 Tons—6″ Stroke.
The primer hole is indented to prevent expansion of primer seat in service.

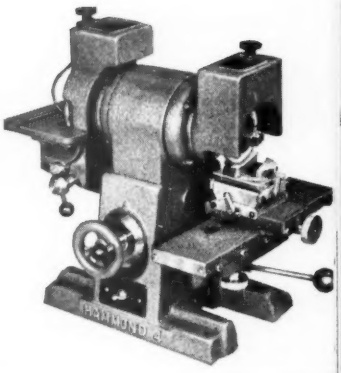
*On 75 mm case, a 1000 Ton Knuckle Joint Press has been used and found to be a little light, although only 640 Tons are required. When using Knuckle Joint Presses double estimated tonnage.

OPERATION No. 14 — **ANNEAL**

Method: Cases are placed in anneal rack and submersed mouth down into molten salt at 950 F, 9″ deep, for 1¾ minutes for smaller

(Continued on Page 36)

Hammond "4" Chip-Breaker Grinder for Carbide Tools



A NEW machine for grinding chip-breaker grooves in carbide tools with a 4" peripheral diamond wheel and built around a new-type universal-angle tool vise designed to give greater accuracy and convenience has been placed on the market by Hammond Machinery Builders, Inc., Kalamazoo, Mich. Development of this machine was stepped up as a contribution to Defense production.

The new tool vise provides three separate planes of adjustment in setting the grinding angle. Each plane is adjustable by means of accurately scaled readings. The vise consists of two machined steel blocks rounded on the bottom, cradled into each other at right angles and "frozen" together after adjustment by means of cam locks. A flat circular piece mounted on top of these blocks carries the vise jaws, which hold tools firmly by means of Allen Screws. The circular piece swivels 90 degrees from center of any of the four sides.

After the tool has been mounted in the vise, adjusted to the desired grinding angle and locked, the entire unit is raised into contact with the grinding wheel by the calibrated hand wheel at front of the machine.

The vise is mounted on the reciprocating table as shown and cross-feeds by means of a calibrated hand wheel. With the tool in grinding position, the table carrying the vise reciprocates at right angles to

(Continued on Page 34)

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Tomkins-Johnson Announces New Rivet-Pierce Rivitor

THE new "RK" machine, an automatic feed Rivet-Pierce Rivitor, has been announced by The Tomkins-Johnson Co., manufacturers of Rivitors, Clinchors, T-J Air and Hydraulic Equipment and T-J Die Sinking Milling Cutters. On the new "RK" the work remains in the same position for the piercing and the riveting. On the first trip of the machine the ram descends and forces the work down over the unannealed rivet, punching a slug out of the work. The slug drops through a hole in the front of the head which reverses (moves 90 degrees) on the upstroke, bringing the riveting head into position. On the second trip of the machine the ram descends and heads the rivet. On the upstroke the head again reverses, bringing the piercing die into position for the next stroke.

The rivet is underfed. The transfer ram cylinder carries the rivet at the end of the preceding stroke from the hopper and leaves it in the "fingers" at the anvil. A 2 to 1 gearing from the crankshaft to the cam which operates the valve for the rivet transfer ram cylinder delivers a rivet to the fingers at every other stroke of the ram.

The illustration shows the "RK" on the riveting stroke. Work support fixtures on both the riveting arm and a lower support ride in the channel between the steel side plates. Non-repeating action, solenoid trip control is provided.

The "RK" takes unannealed solid steel rivets up to .140" by ¼" long. This size can be set to a maximum total work thickness of .075".

(Cont'd on Page 34)

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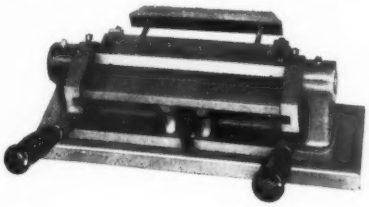


by the same manufacturer, O'Neil-Irwin Manufacturing Company, of Minneapolis, Minn. Steel plate or non-ferrous materials in either sheet or strip stock can be formed into brackets, angles, Vees, etc., to within .001" tolerance of duplicated work by the use of precision adjustable stops. Folding to 110 degrees of radii is readily done.

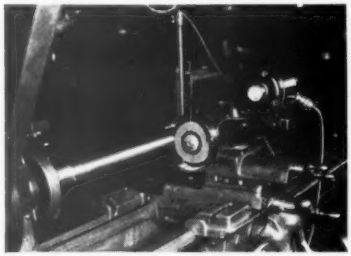
The pivoted folding plate is of ordinary cold rolled steel and may be drilled, tapped or slotted for precision material gage and stops for forming both right and left hand angles eliminating conflicting ends of material in folding. This plate may be readily replaced from regular stock material whenever necessary. Micro No. 2 Die Duplicating Brake may be arranged for either right or left hand operation or both handles may be operated simultaneously for heavy metal working.

The new brake, built of heavy machine tool gray iron castings and cold rolled steel, has contact parts of hardened and heat treated steel. Oil cups provide for lubrication of the main bearings.

Micro No. 2 Die Duplicating Brake will handle the considerable range of work between the floor type brake and light work done on a hand operated vise. The brake is easy to work to because folding operations are fully visible to the operator, assuring him complete control and inspection over his work.

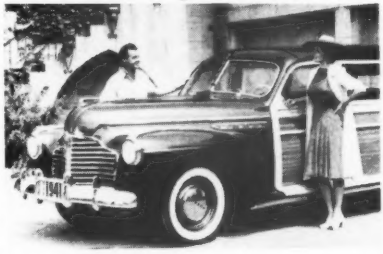
For complete specifications of Micro No. 2 Die Duplicating Brake write O'Neil-Irwin Mfg. Co., 315 8th Ave., So., Minneapolis, Minn.

Dumore grinders are used by watchmakers to get greater accuracy in tools and dies.



Dumore No. 7 in the Revere Copper and Brass plant at Rome, N. Y. Here a 3/8" tool steel shaft is getting a mirror-like finish on a Lodge and Shipley lathe, using a 4½" diameter wheel, turning at 4,200 r.p.m.

Accuracy to.0001"



Wherever automobiles are built you'll find Dumore Tools prominently in use, for they bring precision to an industry that seeks ever increasingly high standards. Easy portability and ready adaptability count, too.

Where precision of fit or finish is essential . . . and cost is a consideration . . . do as others are doing . . . put Dumore Grinders to work. They make savings up to 30% as compared to alternative methods and equipment costs. Ask your Dumore Distributor for full facts and a demonstration in your shop

Dumore PRECISION Grinders

THE DUMORE CO., Dept. 371-G Racine, Wis.

Localized Lighting Aids Defense Production

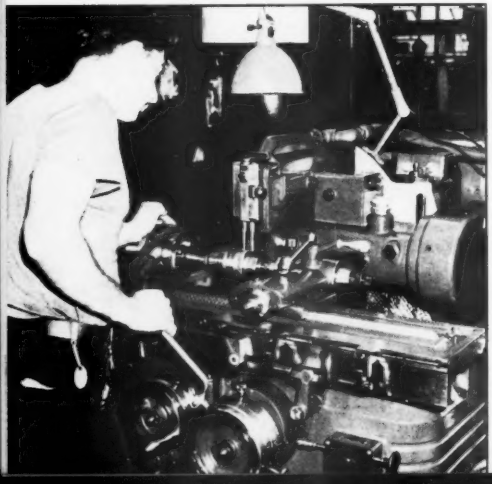
THE great importance of efficient modern lighting in the speed-up program for National Defense is brought home emphatically by the experience of blacked out cities abroad. Since we do not have elaborate standby equipment, a sudden stoppage in electrical distribution for only a few days in 2 or 3 of our great manufacturing cities would bring confusion and seriously disrupt, if not entirely stop, production.

To industry good lighting is lighting that makes for better, easier vision, safer working conditions and that helps minimize spoilage due to faulty lighting—too much as well as too little.

Most industrial executives have considered the advice of lighting experts on this problem of supplying localized* or direct lighting, in addition to general illumination. They have, accordingly, equipped their machines, inspection lines, laboratory and drafting benches with direct lighting equipment to give workers the maximum necessary light to do efficient work and reduce eyestrain. Shop men have learned that additional illumination at the point of work is a definite aid in the use of precision instruments and in holding to close tolerances.

An example of how direct lighting is helping in the Defense Program is shown by the illustration below of localized lighting on a machine in one of the plants of a leading plane manufacturer.

***A leading manufacturer of such equipment, The Fostoria Pressed Steel Corp., Fostoria, O., has available Catalog No. 25, covering over one thousand Fostoria Localites.**



Kauffman Adds 2-Spindle Head to Tapping Machine

The new Kaufman No. 10-A Hi-Duty Tapping Machine with Hi-lo gearing, equipped with a two-spindle head and semi-automatic magazine fixture, is now being manufactured by L. J. Kaufman Co., Manitowoc, Wisconsin. In its operation, nuts are fed to the magazines by hand, and are located beneath the taps and ejected automatically; 12 speeds are provided in geometric progression. This tapper can also be equipped with a revolving index type fixture or any other type normally used in this class of work.

A Bulletin giving full particulars on the new Kaufman No. 10-A Hi-Duty Tapping Machine is available. Ask for Bulletin TD when you get in touch with the L. J. Kaufman Mfg. Co., Manitowac, Wisc.

Hammond Chip-Breaker Grinder

(Continued from Page 31)

base of the machine, actuated by the lever directly below, to accomplish desired grooving of the carbide tool. For wet grinding, a coolant tank is mounted over the 4" wheel with flow controlled by a needle valve.

The grinding assembly on the left side of the machine may be used for rough or finish grinding of carbide tools, using a 6" Silicon Carbide or Diamond Cup wheel. An integral wheel guard and coolant tank with needle valve is mounted over the wheel. To change wheels, the entire unit may be easily slid off the supporting shaft by loosening one clamp. A tilting work table, slotted for protractor angle-guide and fitted with easily cleaned sludge pan completes the grinding assembly.

Specifications, operation data and prices on the new Hammond "4" Chip-Breaker Grinder will be sent on request. Ask for Bulletin GP-5 when you write Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich.

Rivet-Pierce Rivitor

(Continued from Page 32)

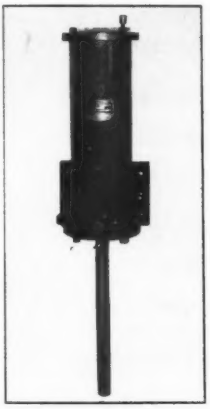
Full specifications on the new "RK" Rivet-Pierce Rivitor with information desired for a quotation are in Bulletin RK-1 a copy of which will be sent on request. Address The Tomkins-Johnson Co., 630 N. Mechanic St., Jackson, Mich.

Announces New Pneumatic Counterbalance Cylinder

THE Dayton Rogers Manufacturing Company announces a new design in a Model GT Counterbalance Cylinder for large, straight-side punch press equipment.

These pneumatic counterbalance cylinders operate direct from the air line system in the average shop and serve to counterbalance the large rams on the larger straight-side presses, compensating for the increase or decrease in the size of the die tooling equipment attached to the press ram. This counterbalance compensator is regulated by a combination regulator and air pressure gage furnished with each set of counterbalance cylinders.

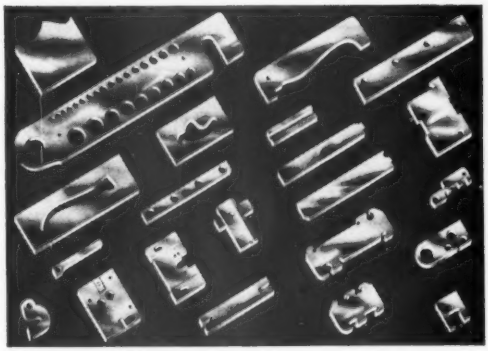
The counterbalance cylinders are installed in groups of 2, 4 or 6 and automatically take up the lost motion due to the wear



of the parts and the large clutch mechanisms, which is especially objectionable on large dies both in forming and blanking operations. By the use of these counterbalance cylinders a press operating with a clutch jam may be operated without the use of the retarding brake or with only slight friction on the brake itself as the counterbalance cylinders will give the required retarding controlled action. These cylinders are made from 6" to 14", having strokes from 12" to 24". Both the steel polished cylinders and piston stem are hard chrome plated to prevent rusting and pitting.

Complete information on the new Model GT Counterbalance Cylinder is available from the Dayton Rogers Mfg. Co., Minneapolis, Minn.

THIS IS NO TIME TO WASTE TIME



Making Parts Like These . . .

Don't tie up men and machines grinding stock for small parts, tools, gages, etc. Use Starrett No. 495 Ground Flat Stock. It comes in 18-inch lengths in a complete range of widths and thicknesses. Made of first quality annealed tool steel, cut lengthwise from the sheet, ground to within .001" of size. Individually packaged and marked. Write for special Ground Flat Stock Folder "DM" and for a handy reference wall chart.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Precision Tools . . . Dial Indicators . . . Ground Flat Stock
Hacksaws . . . Metal Cutting Bandsaws . . . Steel Tapes
ATHOL, MASSACHUSETTS, U. S. A.

STARRETT
GROUND FLAT STOCK
AVAILABLE THROUGH ALL LEADING SUPPLY HOUSES

Equipment and Operations Required for Making Cartridge Cases

(Continued from Page 30)

cases and 2½ minutes for larger cases. Be sure to vent shells for expansion of gases. Cold water rinse for salt. Hot water rinse for drying.

OPERATION No. 15 — **TAPER**

Equipment: Hydraulic Dial Feed Presses (single or six station).
Cases up to 3″ dia.—40 Tons—60 fpm—30″ Stroke.
Cases over 3″ dia.—125 Tons—60 fpm—45″ Stroke.

Method: Case is placed mouth down in die and ram pushes on head to force case into die taper.

OPERATION No. 16 — **MACHINE HEAD AND PRIMER HOLE**

Equipment: 4-Spindle Automatics, Chuckers. Turret Lathes, Drill Presses, Tapping Equipment — also special Single Purpose equipment available.

OPERATION No. 17 — **TRIM MOUTH TO OVERALL LENGTH** (after tapering)

Equipment: Same as Operation No. 16.

OPERATION No. 18 — **WASH-ALKALI or DEGREASER**

Equipment: Alkali washers and degreasers.

OPERATION No. 19 — **MOUTH ANNEAL**

Same as Operation No. 14, except venting is not necessary, as primer hole is now in head. Anneal 2⅛″ deep, 2½ minutes.

OPERATION No. 20 — **RINSE**

Cold water to wash off salt.
Hot water to dry.

OPERATION No. 21 — **ANNEAL** (for complete stress relief)

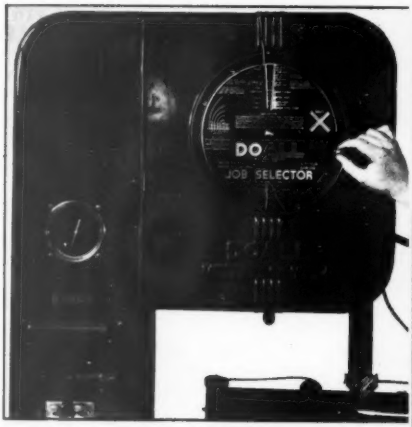
Equipment: Conveyor-type furnaces.
Method: Cool in air.

OPERATION No. 22 — **STAMP**

Equipment: Mechanical or Hydraulic Presses (dial or single station).
Cases up to 3″ dia.—15 Tons—30 SPM—3″ Stroke.
Cases over 3″ dia.—40 Tons—30 SPM—6″ Stroke.
Or special arrangements on Standard Marking Machines.

On all crank-type Presses, double above tonnages.

New Job Selector on All DOALL Machines



WITH the increasing demand for speed in production covering thousands of materials, the new DOALL Job Selector is a ready reference to all basic materials which are to be contour sawed or filed. Recognizing the great increase in use of alloys, Continental Machines, Inc., Minneapolis, Minnesota, has incorporated this new Job Selector on all the DOALL contour sawing, filing and polishing machines. The new Job Selector is an improvement over the previously used Selector.

The new Job Selector contains 56 basic materials; ranging from ferrous to non-ferrous materials. A flip of the operator's hand brings to his eye, at a glance, the correct Sawing Speed, Saw Pitch, Saw Temper and Saw Set that will insure the most economical performance from the DOALL machine. The same information is given when the DOALL is used as a filing machine.

Other information incorporated on the Job Selector dial includes oiling directions for the machine and the minimum width of saw to use in cutting contours of various radii. Light glare has been eliminated by curving the face of the dial, giving the operator distinct readings at all times.

Cardboard replicas of this new Job Selector are available for DOALL users, students and N. Y. A. programs upon request. Write Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis, Minn.

HAY! CUT IT OUT!
Get rid of that sharp, cluttering "hay" spiraling from your cutting tools. Break it up with HAMMOND'S new Chip Breaker Grinder that grooves Carbide Tools on any angle to hair-line precision.
Write TODAY for Bulletin GP-5
HAMMOND "4"
CHIP BREAKER GRINDER
Hammond of Kalamazoo
HAMMOND MACHINERY BUILDERS, INC.
1631 DOUGLAS AVE. · · · KALAMAZOO, MICHIGAN
Eastern Branch 71 West 23rd Street New York City

New Du Pont Explosive Rivets Speed Plane Production

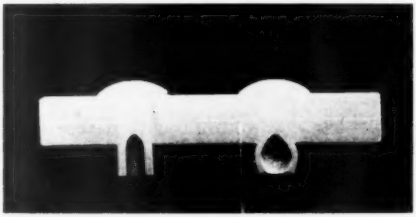
By D. L. Lewis, Jr.

EXPLOSIVE rivets of an entirely new type are now being manufactured in commercial quantities by Du Pont. A charge of high explosive secreted in a cavity at the end of the shank is detonated by heat applied to the rivet head by an electric gun. The explosion expands the charged end of the shank, thus forming a "blind" head and setting the rivet.

The explosive rivet is expected to be of great importance in aircraft production—since its use simplifies design and speeds assembly. The whole operation is performed from one side with greater ease and speed than is possible by any mechanical means now in use.

Engineers estimate that from 800 fastening points in an all-metal pursuit plane to as many as 10,000 in the largest all-metal bomber are accessible only from one side. That fact has presented one of the most troublesome bottlenecks in the mass production of fighting planes. The development of the all-metal design, particularly the employment of the lighter metals such as aluminum and magnesium alloys, requires some 40,000 to 500,000 rivets or more per plane. The job is one of the most exacting and tedious that confronts plane builders, and grows more so as planes become larger. For example, the recently completed B-19 Douglas bomber, largest ship of its kind ever built, is said to have 3,000,000 rivets.

There are many structures or sections of plane structures which are totally or partially inaccessible from the rear. These require fasteners which are capable of being installed entirely from one side, usually termed "blind rivets." Many kinds of mechanical blind rivets have been developed, but in general they have compared unfavorably with bucked rivets in physical and structural properties, in addition to being more costly to install. So serious has been this difficulty that designers have made efforts to avoid it.



"Before" and "after" (right) views of the explosive rivet

With the best mechanical methods now in use, a skilled workman can set about two to four of these blind fasteners per minute, after they have been placed in the holes. The equipment is comparatively expensive. The new Du Pont rivets may be installed by one workman at a rate of 15 to 20 rivets per minute, once they are in place. The riveting gun or iron weighs less than five pounds. The rivets themselves weigh only about one-fourth as much as generally used blind fasteners of mechanical design.

The photograph shows the Du Pont Rivet, in both the original and installed condition. Prior to installation, the rivet

(Continued on Page 49)

The electric riveting tool shown installs 15 to 20 rivets per minute

Finger-Tip CONTROL

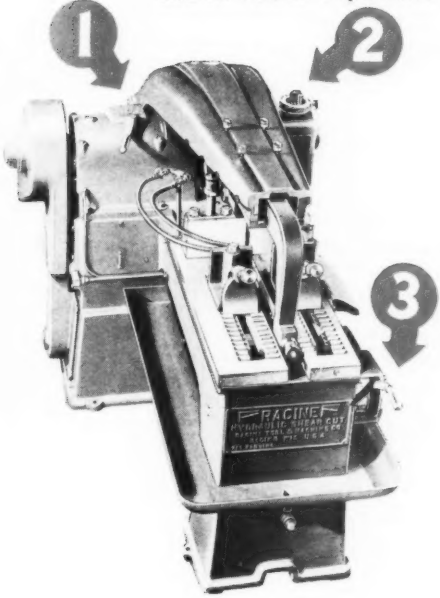
Speeds Production

WITH

RACINE

HEAVY DUTY HYDRAULIC METAL CUTTING MACHINES

Ease of handling saves real time in Tool & Die Cutting and RACINE Hydraulic saws do just that!



1. Speed Change Control . . . Single lever controls three speed transmission for cutting all types of steel.

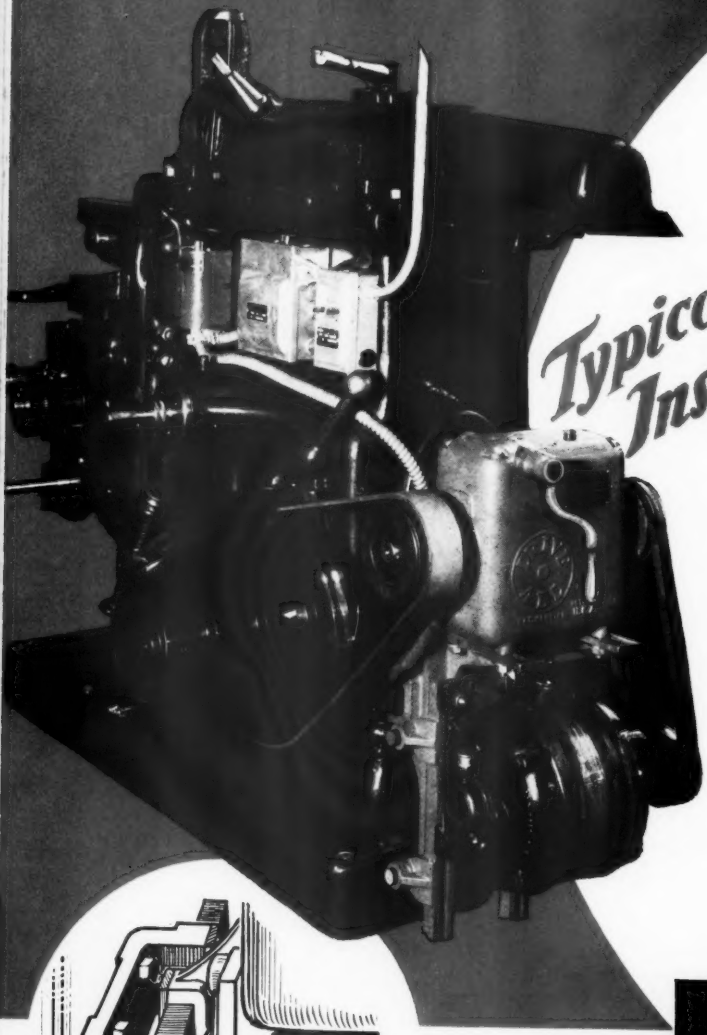
2. Single Dial Controls pressure and feed. Sensitive, accurate control of cutting from thinnest walled tubing to toughest tool steel and die blocks.

3. Single Lever All Front Control governs rapid traverse up and down, clutch engagement and rest positions, all operating phases of the machine.

RACINE modern hydraulic saws, 6 x 6, 10 x 10, up to 14 x 20, are unequaled in the cutting of bar stock—structurals—die blocks—in steel mills—shipyard and production plants—wherever metal cutting jobs are tough. Send for information today.

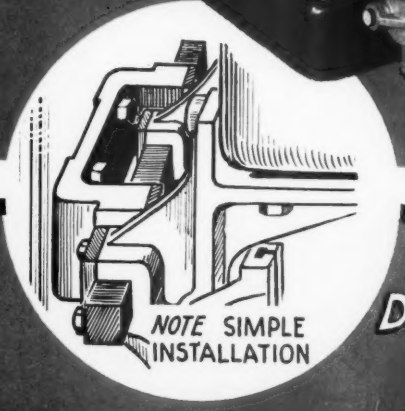
RACINE TOOL AND MACHINE COMPANY
1768 STATE ST., RACINE, WISCONSIN

DRIVE-ALL



Typical Shaper Installation

Brackets to Fit
Carried in Sto
Brown



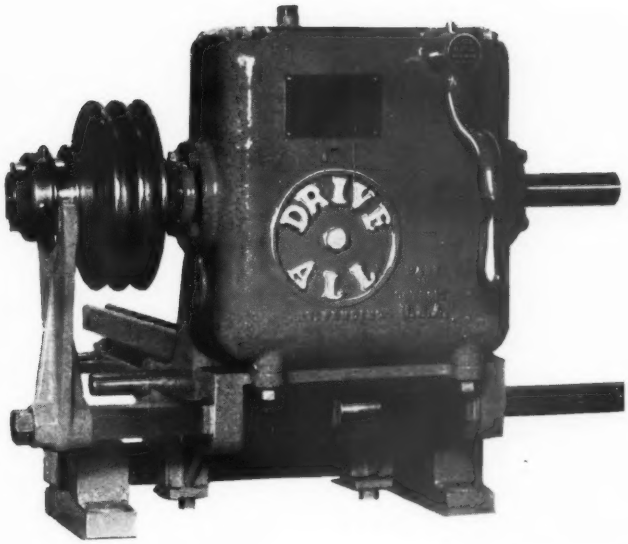
PROMPT DELIVERIES

DRI
MANUFAC
3400 Conn

Motorizing Unit

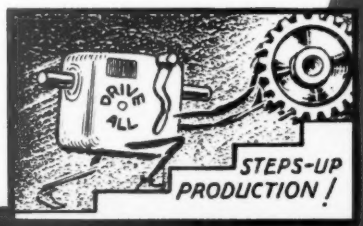
with CLUTCH CONTROL

optional on all models!



Fit All Machines up to 10 H.P. Stock. Also Special Units for Brown & Sharpe Automatics.

(Patents Granted)



RIVE-ALL

UFACTURING COMPANY

Conner Ave., Detroit. Mich.

shop where a variety of items is molded of approximately the same size or complexity.

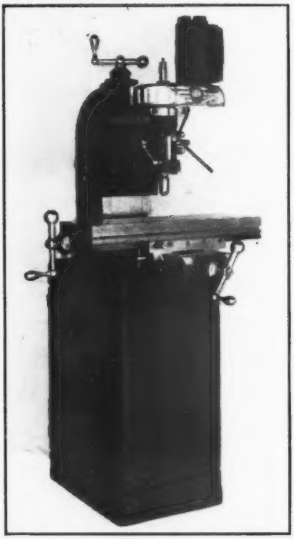
Since no side or parting line cores are required in this mold the guide pins are extended from the injection or cover mold half. Because the mold is an ejector type design, the pins do not have to guide or carry a stripper plate. The advantages of this type of design are: longer guide pins may be used since they are not in the operator's way; the finished casting is free to fall or be removed without obstruction; the use of a swinging or brush-off bar as furnished with some molding machines is facilitated.

Ejector Box Supports

Since injection molding uses pressures from 16,000 to as high as 50,000 psi, molds must be strong. The point at which such molds are apt to be weak is the ejector box opening, which provides for the ejector plates and space for their travel (detail 14). Some form of support is usually good practice. One convenient method of support is illustrated by the two round bars (detail 4) which extend through clearance holes in the ejector plates from the ejector half mounting plate of the machine to the core back-up plate (detail 15). This space is shown as "B", section "A-A". However, one molding machine is constructed in such a manner that the register hold is bored straight through the mold movable mounting plate. In this case, it is apparent that no support bars could be used. Therefore the core back-up plate (detail 15) should be made as heavy as possible and the opening in the ejector box as small as possible.

The second alternate design—a stripper plate mold—for the same casting will be published in an early issue. The original design is in Chapter V of "Plastics Mold Designing" by Gordon B. Thayer.

New Holland High Speed Vertical Milling Machine



designed for rapid and accurate

Drilling - Boring - Milling

of tools, dies, moulds, or for experimental and production work.

Note extremely rugged and compact design and unusual range; table movement 8″ x 16″; combined quill and quill head travel 11″.

HS Head swivels around own axis, graduated to 90° each direction and offers 7 speeds. Quill is chrome plated; spindle runs on 4 pre-loaded ball bearings. All feed dials graduated in .001″.

Send for Circular T which gives full specifications and operation data

MARBURG BROTHERS, INC. 88-92 West Street New York, N. Y.

New Boice-Crane Band Saw Has Several Outstanding Features

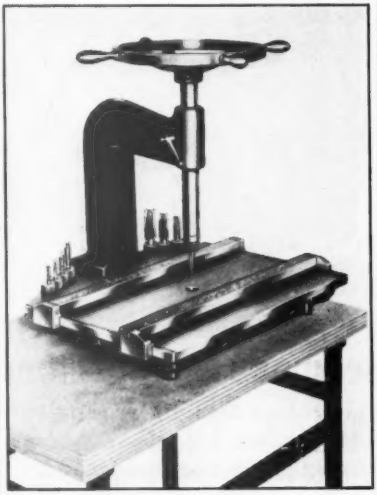
THE new model 2300 14" Boice-Crane Band Saw has a number of outstanding features including welded steel machine frames, telescoping blade-guard, single knob control blade guides, new lightweight molded wheels and higher blade speed.

The entire frame work is electric welded giving great strength and practically eliminating vibration. The solid disc wheels are molded Textolite which weigh only one-third to one-half as much as equivalent pressed steel or cast iron wheels yet put less blade-strain on the Boice-Crane blades at speeds of 1200 rpm than deemed safe on some equipment at 600 rpm. The blade speed is 4400 fpm at wheel speed of 1200 rpm.

The telescoping blade-guard completely surrounds the blade—the guard is strong enough to absorb severe blows without sagging or deflecting against the blade. The guard, which is held friction tight by a compression spring, also covers and shields the blade-guides. The blade-guides are equipped with large ball bearing roller and hardened steel jaws mounted on individual slide castings. Adjustments of roller and jaws are independent and by single knob control.

(Continued on next page)

THE VIKING
REG. TRADE MARK
TAPPER



A PRECISION BUILT TOOL

Base, semi-steel casting, well ribbed and seasoned to prevent warping.
Two sliding parallel bars to hold work in place while tapping.
Quick changing adaptors, requiring but 5 seconds to change tap.
Steel spindle hardened, ground and lapped to a perfect gage fit.
Spindle lock for holding spindle in position.
Two spindle bearing bushings hardened, ground and lapped.
Aluminum handwheel with four inserted steel handles.
Bracket arm, semi-steel casting bottom scraped to insure spindle is perfectly square with base.

Send for Circular

THE VIKING TOOL & MACHINE CORP.
6 Main St. Belleville, N. J.

Pneumatic Die Cushions

can produce deep drawn parts on both contract and quantity production basis more economically and advantageously than they can be turned out by the use of springs or rubber bumpers.

Many manufacturers acclaim this cushion, and we will be glad to give recommendations as to the best type of cushion for your requirements.

Write for catalog

Immediate Delivery on Trial Basis

DAYTON ROGERS MANUFACTURING CO.
MINNEAPOLIS, MINN.
PNEUMATIC DIE CUSHIONS

Greenfield Tap & Die Corp. Moves into New Plant

DEDICATORY exercises held May 30 marked the beginning of production in the new gage plant of the Greenfield Tap & Die Corporation at Greenfield, Mass. Harry Kellogg, veteran gage maker who made the first commercial gage sold by the company in 1910, presented the first set of gages made in the new plant to General G. M. Barnes, assistant chief of Industrial Service, Office of Chief of Ordnance, who, with other military and industrial leaders, attended the ceremony.

The new building, one of four gage plants built with the cooperation of the Government, will provide facilities to quadruple former production. The new plant will be devoted entirely to plain, thread and limit snap gages. New equipment includes thread grinding machines and lapping equipment as well as improved heat treating facilities. The entire building is air conditioned to provide for close control of finishing operations.

New Boice-Crane Band Saw

(Continued from Page 43)

Adjustments to prevent creeping can be made by individual thumb screw locks safely even when the machine is running. Guides are supplied both above and below table as regular equipment.

The 15" x 15½" table is rigidly supported on two large trunnions. The entry-slot leads forward to the front edge of the table which tilts 45 degrees right, 10 degrees left and is equipped with a 90 degree locating stop.

Three models for woodworking and an 8 speed model (gear box drive unit) for metal sawing are in the 1941 line. A gear shift lever gives instant change of speeds for sawing iron and steel, brass and copper, aluminum and zinc, plastics and other materials. A screw-feed for metal cutting has a segment for holding securely metal of any shape. With the Boice-Crane screw-feed 1-inch cold rolled steel can be cut at the rate of 2 linear inches per minute.

Full specifications and details of all outstanding features of the new 2300 Band Saw are in the new catalog 41-A. For your copy write Boice-Crane Co., 930 W. Central Ave., Toledo, O.

Modern Screwdriving Equipment

that cuts assembly costs

NO LIMITATIONS

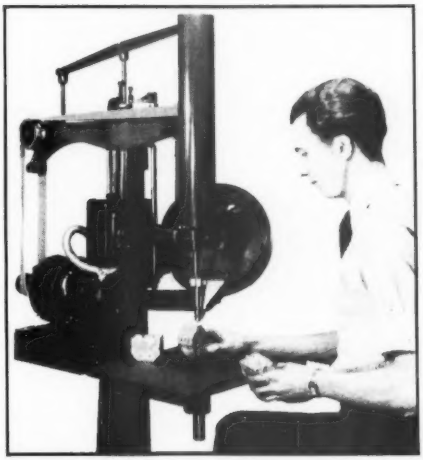
Machine Screws
Wood Screws
Self Tapping Screws
Cap Screws
Drive Screws
Special Screws

—

Standard Heads
Special Heads
Slotless Heads
Hex Heads
Square Heads
Phillips Heads

—

Send Samples for Production Estimates



—HERE'S HOW

No Marring of Heads
No Twisting off Heads
No Handling of Screws
No Stripping of Threads
No Production Bottlenecks

—

Uniform Tension of Screwdriving Eliminates Inspection

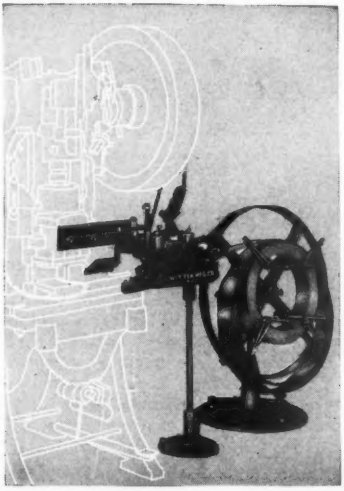
—

Three Models to Meet All Requirements

DETROIT POWER SCREWDRIVER CO.

5385 Rohns Ave.
Detroit, Mich.

WITTEK *Automatic* ROLL FEEDS AND REEL STANDS



★ FOR ANY MAKE OR SIZE PUNCH PRESS

Wittek Automatic Roll Feeds provide an improved and simplified method of punch press operation that insures rapid feeding under all conditions. Wittek Roll Feeds handle any type of coiled strip stock and are made in single roll, double roll, and compound types with straighteners, in models to feed in any of four directions.

Wittek Adjustable Reel Stands provide automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and backlash of stock.

If your production problem involves feeding coiled stock to punch presses, it may be solved by consulting us. Your inquiry will be given immediate attention. Send for complete descriptive catalog.

WITTEK MANUFACTURING CO.
4305 W. 24TH PL., CHICAGO, ILLINOIS, U.S.A.

Revised List of SAE Steels

SOME years ago the Society of Automotive Engineers, in an effort to standardize on a logical system for both specifying and identifying alloy steels and to cooperate with the manufacturers of such steels in reducing the number of such steels necessary to stock, arrived at a numeral index system, now in practically universal use. Revisions from time to time have been made to keep up with requirements in the automotive and other industries that use this system and with metallurgical developments.

The latest revision as published in the 1941 SAE HANDBOOK shows that the previous list of 109 standard steels have been reduced to 84. The principal change has been in the deletion of the Tungsten (7000) series. The prefix T for the Manganese (1300) series has also been dropped. The revised list consists of 72 carbon and alloy grades and 12 corrosion and heat-resisting alloys. The revision is the first since 1935.

The basic numerals for the 1941 list of SAE steels are:

Type of Steel	*Numerals (and Digits)*
Carbon Steels	1xxx
Plain Carbon	10xx
Free Cutting, (Screw Stock)	11xx
Free Cutting, Manganese	X13xx
Manganese	13xx
Nickel Steels	2xxx
3.50 Per Cent Nickel	23xx
5.00 Per Cent Nickel	25xx
Nickel Chromium Steels	3xxx
1.25 Per Cent Nickel, 0.60 Per Cent Chromium	31xx
1.75 Per Cent Nickel, 1.00 Per Cent Chromium	32xx
3.50 Per Cent Nickel, 1.50 Per Cent Chromium	33xx
3.00 Per Cent Nickel, 0.80 Per Cent Chromium	34xx
Corrosion and Heat Resisting Steels	30xxx
Molybdenum Steels	4xxx
Chromium	41xx
Chromium Nickel	43xx
Nickel	46xx and 48xx
Chromium Steels	5xxx
Low Chromium	51xx
Medium Chromium	52xxx
Corrosion and Heat Resisting	51xxx
Chromium Vanadium Steels	6xxx
Silicon Manganese Steels	9xxx

PREFIXES

The prefix 'X' is used in numerous instances to denote variations in the range of elements.

The first digit identifies the type of steel. The second digit indicates the approximate percentage of the predominant alloying element. For example "10xx" indicates a plain carbon steel; "21xx" indicates a nickel steel with 1.50 percent of nickel; and "52xx" indicates a chromium steel with a medium chromium alloying element.

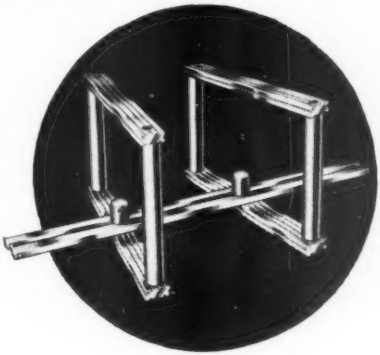
The third and fourth digits (a few have five) indicates the average carbon content in hundredths of one percent. For example, SAE 1040 indicates a plain carbon steel of .40 percent carbon; SAE 1120 indicates a free cutting or screw steel with an average carbon content of .20 percent; SAE 3140 indicates a nickel chromium steel (1.25 percent nickel, .60 percent chromium) with an average carbon content of .40 percent.

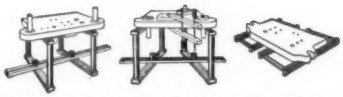
Complete SAE Standard Specifications are available in the 1941 SAE HANDBOOK and in the latest catalogs of leading steel suppliers.

Acro Introduces New Die Cradle

A NEW and extremely important tool for die makers has just been announced by the Acro Tool and Die Works. Named the Acro Die Cradle, it is, in effect, a universal parallel unit. It is adjustable in length and eliminates makeshift methods for supporting dies, jigs, metal parts, etc., while drilling, counterboring, tapping, milling, or grinding. It is particularly helpful in speeding up production; its safety and time saving features are appreciated at a glance by any tool and die maker or machinist.

The Acro Die Cradle is easy to manipulate, as there are only two thumb screws for quick adjustment to any desired length. The standard height of the parallels is 7", with an adjustment for length up to 20".



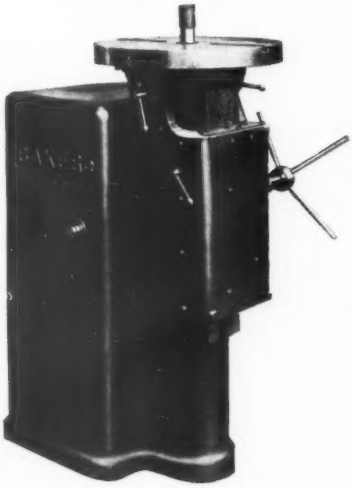


The Acro Die Cradle is made of high-grade steel, hardened and ground to close tolerances, assuring accuracy. It is very sturdy and yet light enough to move about easily from job to job. The cradle sells at a price well within reach of all tool and die shops, machine shops, as well as manufacturing plants of all kinds.

Catalog sheets and complete details, including the very attractive price of the new Acro Die Cradle, will be sent promptly on request. Address Acro Tool and Die Works, Dept. TD, 2815 Montrose Ave., Chicago, Ill.

Save Valuable Tool, Gage and Die Making *Time*
by using

BAKER
Contour Grinder



TOOL ROOMS AND DIE SHOPS WILL RECOGNIZE THESE NUMEROUS ADVANTAGES:

Convenient working height, complete visibility.

Vertical spindle mounted on large precision anti-friction bearings. Three speeds from Vee Belt drive.

Cam actuated reciprocating action, which can be disengaged when dressing the wheels.

Well ribbed 18" table with T-slot to front and rear. Mounted to provide angles for grinding of angular relief in dies, etc.

Wheels quickly interchangeable and held securely.

Quick acting capstan control of table slide.

Assembly protected against grindings and dirt.

For full details, write today for Contour Grinder Folder

BAKER BROS., INC.
TOLEDO OHIO

Recent Industry Publications

RACINE METAL CUTTING MACHINES—Catalog 80-B fully describes the Racine hydraulic shear cut principle, gives details of construction of the six heavy duty metal cutting machines in the Racine line. These are the latest developments in rugged, high grade machines using hydraulic power for ease of control and speedy cutting. Catalog 70-B shows the two Racine Utility Saws (Wet Cut and Dry Cut, each 6"x6" hydraulic feed), the machines designed for handling all the work of a small shop or for auxiliary medium duty use in the large shop. The outstanding features are given in detail. For either or both of these Catalogs, address Racine Tool and Machine Co., 1768 State Street, Racine, Wisconsin.

DISSTON TOOL STEELS—Catalog No. 100-S, a profusely illustrated book bound in a durable board cover, gives analysis, complete working instructions and recommendations for each of the tool steels in this old, well-known line. A feature seldom found in steel literature, a reverse recommendation—"when not to use" each type of steel, is of particular value to the tool and die shop in arriving at a decision between several possible steels. High speed, die, mold, saw, chisel and a number of special steels are listed and described. A number of tables of useful information includes a Disston Tool Steel Work Chart. Please use your letterhead when you write for your copy of Catalog No. 100-S. Address Henry Disston & Sons, Inc., Dept. TD, 1020 Tacony Ave., Philadelphia, Pa.

DANLY DIE MAKERS' SUPPLIES—10th Edition—the five sections of this Catalog, which is standard in thousands of shops and departments, are retained in this edition. These cover in turn: Precision Die Sets, Commercial Die Sets, Large Semi-Steel Die Sets, Large All-Steel Die Sets and Die Makers' Supplies and Accessories. The familiar form of using colored tint blocks for material combinations of die and punch holders in the first two sections is retained. Specific instructions for ordering are conveniently located to each group of specifications. The accessory list includes dowel pins, guide posts and guide post bushings, socket head cap, hollow and square head set screws, die springs, clamps, including the Kwik-Klamp and templets. The list of eight stock points and a discount sheet is included. For your copy of the 10th edition of Danly Die Makers' Supplies write Danly Machine Specialties, Inc., at 2121 S. 52nd Ave., Chicago, Ill., or the branch nearest you (see ad page 10).

GAS APPLIANCES FOR EVERY INDUSTRIAL PURPOSE—Catalog No. 41, issued by the Johnson Gas Appliance Co., 611 E. Ave., N. W., Cedar Rapids, Iowa, describes and illustrates their entire line of burners, furnaces, torches, mixers, valves and blowers. Among the new items shown are the Johnson No. 130 Hearth Type Furnace; the No. 570 Pot Type Hardening and Melting Furnace and the No. 120 Hi-Speed Furnace. Also included is a chart showing correct Carburizing and Heat Treating Temperatures, a Heat Color Chart, and an Index and Price List for Johnson Industrial Appliances. Write for your copy of Catalog No. 41 today.

NEW SOUTH BEND 9" LATHE CATALOG—A new, illustrated catalog, covering South Bend 9" Precision Lathes, Models A, B and C, has recently been announced by the manufacturer. Two new models of the 9" Precision Tool Room Lathe are described in this 56-page catalog, as well as the 26 other types making up the balance of the 9" line. Among the uses for these lathes are production operations on precision parts and tool room work. Each is designed to handle a wide variety of work, and the information given permits the selection of the type that is best suited. All attachments, tools and accessories for use with these lathes are shown. Copies of Catalog 50-B are available from South Bend Lathe Works, 198 E. Madison St., South Bend, Ind.

FEDERAL SPRAYERS AND DISPENSERS—a new circular being distributed by the Specialty Division of Federal Tool Corp. illustrates the principal types of sprayers and dispensing devices designed and built by this company. This company, which has reached a place of leadership in its field, is equipped to do engineering and design service on products of this type. For a copy of the circular address Specialty Div., Federal Tool Corp., 400 N. Leavitt St., Chicago, Ill.

NEW EX-CELL-O INTERNAL THREAD GRINDER AND DOUBLE-END CARBIDE TOOL GRINDER—These two new machines are described and pictured in the latest "Tool Tips", Ex-Cell-O house organ. The Ex-Cell-O internal thread grinder is completely automatic except for loading, shifting; starting lever and resetting grinding wheel. The new Style 45 double-end carbide tool grinder, Ex-Cell-O's sixth carbide tool grinder, Bulletin 46111 gives complete specifications. Address Ex-Cell-O Corporation, 1206 Oakman Blvd., Detroit, Mich.

WELLS PORTABLE SAWS—Circular TD gives particulars on the 3 sizes in which the portable Wells saw is now built. The capabilities of these saws make them indispensable in the tool room and die shop. Check up with your mill supply man or write Wells Mfg. Corp., Three Rivers, Mich.

"GS MACHINISTS' TOOL CHESTS"—This Bulletin describes the three lines of GS Tool Chests. Full specifications and illustrations of features of the three lines are given. List prices and an order form are included. Address George Scherr Co., Inc., 128-B Lafayette St., New York, N. Y., for your copy.

JESSOP'S MOGUL MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL—A new 12-page booklet gives the physical properties, approximate analysis, hardness value and heat treatment of Mogul, a steel that is increasingly popular in tool and die shops for many applications for which 18-4-1 high speed steel has been used previously. Several advantages over

(Please turn to Page 50)

New Explosive Rivets

(Continued from Page 38)

is similar to a solid rivet except for the cavity which is concentric with the shank and open at the shank end. The cavity holds the small explosive charge which, when heated to a certain temperature, detonates and expands the shank end uniformly without cracking. The rivet to the right in the illustration shows the shape of the shank after expansion. So accurately has the explosive charge been controlled that the expansion it effects may be held within limits of 20/1000th (.020") of an inch—a remarkable achievement.

The heat necessary to the installation is supplied by means of a specially designed electric tool with a silver tip, known as the Du Pont Riveting Iron. The application of the iron to the die-formed head of the rivet is shown in the larger photograph on Page 38.

Rivets are "Age Hardened"

The rivets now being manufactured are of an aluminum alloy. Of varying diameters and sizes to meet structural requirements, they are of the modified brazier head and countersunk types, the latter permitting the flush riveting required by modern high speed planes. The rivets are installed in the "age hardened" condition and do not require refrigeration after heat treatment, so necessary with solid rivets in the same alloy. In shear and tension, these rivets develop values which are approximately the equivalent of driven rivets, the type now most widely used.

The Du Pont Explosive Department early in 1939 acquired the North American rights to an invention of two Germans, Karl and Otto Butter, who conceived the idea of setting blind rivets by expanding the shank with a minute explosive charge. Developed in the Du Pont Eastern Laboratory, the design was adjusted to American standards of precision, a new method of developing the blanks was developed and the anodizing process (surface treatment to prevent corrosion) was improved. After testing by both the United States Army and Navy, tests were made in several aircraft assembly shops. The rivets were made on experimental tools but were loaded on production equipment.

CHICAGO MOUNTED WHEELS OF V/T SUPER BOND

150% LONGER LIFE

Rigid tests on snagging and exacting operations prove they have 150% to 300% longer life. Won't ridge on welds, sharp corners, sinking dies, barbering, etc. There's a shape and size to handle every grinding job faster, better, at lower cost. V/T Super Bond is the most important development in mounted wheels in 30 years.

Let us send you a trial Wheel. Tell us the kind of job, type of equipment you use and size wheel you prefer.

Free Mounted Wheel Chart

Ideal for ready reference in the shop. A Wall Chart 22 x 15" showing actual size and shape of every standard Chicago Mounted Wheel.

Handee Tool of 1001 Uses

A small "power house" that can be used wherever there is an electric outlet. Grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. Weighs 12 oz., 25,000 r.p.m. $18.50 postpaid with 7 accessories.

10 Days Free Trial

Send for catalog of complete line.

Chicago Wheel and Mfg. Co.

Makers of Quality Products for 40 Years

1101 W. Monroe St., Dept. TD, Chicago, Ill.

Canadian Office - 1332 William St., Montreal

Recent Industry Publications

(Continued from Page 48)

18-4-1 high speed steel are claimed, including an average of 20 per cent longer tool life. A list of typical applications is also given. For a copy of the booklet on Mogul Molybdenum-Tungsten High Speed Steel write Jessop Steel Co., 610 Green St., Washington, Pa.

TOOL STEEL AND STAINLESS STEEL MANUALS—Two informative manuals on high-alloy steels, both of special interest to tool and die makers, students and instructors in trade and engineering schools, Army and Navy courses, and industrial defense courses, were released by the Allegheny Ludlum Steel Corp., Pittsburgh, Pa. The data contained in the new manuals is sufficiently elemental to give students a clear picture of the analyses, treatment and basic uses of the alloys discussed, but is also inclusive enough to be of value to anyone who works with or uses special steels. Copies of either or both manuals are available free of charge.

CHICAGO RAWHIDE HAMMERS AND MALLETS—These long-lasting, safe and economical hammers and mallets are illustrated in a circular released by the Chicago Rawhide Mfg. Co., 1280 Elston Ave., Chicago, Ill. Specifications and Price Lists are included. Send for your copy.

PRECISION UNIVERSAL TOOL HEAD—Bulletin TD presents interesting job examples for Boring and Facing Both Sides of Connecting Rod; Special Operations on Experimental Pump Chambers; Radius or Distance Rods for a Special Machine Built in Three Sizes, etc. Drawings illustrate each job. Complete specifications for the Precision Universal Tool Head are included. Send for your copy of Bulletin TD. Address The Precision Tool Co., P. O. Box 155, Brooklyn, N. Y.

POSTEL FILING MACHINES—Handy for the tool maker. Made of heavy cast iron construction, these filing machines are adjustable in both directions by opposing screws locking table in position. Write for Bulletin PF, which pictures and describes the Postel Filing Machines. Address Postel Filing Machine Co., 913 Washington Ave., S., Minneapolis, Minn.

BLACK & DECKER 9" HEAVY DUTY SANDER—A circular supplement pictures and lists features and specifications of this new heavy-duty sander equipped with spindle-lock for quick disc changing. Other sanders in the line are also shown. For your copy of the new sander supplement address The Black & Decker Mfg. Co., Towson, Md.

"TORQ-QUA-MATIC"—Torq Variable Speed Transmissions are the subject of Bulletin No. 4SG-1. The Torq Drive is built in standard stock units and is available in two sets of speed ratios to meet practically all conditions of machine tool motorization. A number of typical installations to standard machine tools are shown. The Torq Transmission unit can also be built to specification for special machine builders. For a copy of Bulletin 4SG-1, address The Torq Electric Mfg. Co., 6607 Carnegie Ave., Cleveland, O.

THE HANDEE HI-POWER GRINDER—The latest Handee is the most efficient tool of its type—it has ample power to drive a 2½" diameter wheel, operates at any angle and does scores of tough die shop and tool room jobs. A ten-day Trial Offer on the Hi-Power Grinder is being made by the manufacturer. For a Catalog or a Hi-Power Grinder on the trial basis, write Chicago Wheel and Mfg. Co., 1101 W. Monroe St., Dept. TD, Chicago, Ill.

MILWAUKEE SURFACE PLATES—Bulletin No. 105 illustrates the surface plates, angles and box parallels made by the J. C. Busch Co., 172 So. Ferry St., Milwaukee, Wis.

TORIT DUST COLLECTORS—Bulletin No. 15 describes and pictures the number of self-contained units in this line designed to carry away dust-laden air around grinding, cutting and polishing wheels. Data is given on the proper selection of units, on piping and on the installation of these units. Full prices and specifications are incorporated. For your copy write Torit Mfg. Co., Walnut and Exchange Sts., St. Paul, Minn.

HYDRAULIC ARBOR PRESSES—This new 16-page Bulletin incorporates data and illustrations of the line of Hand Operated Hydraulic Arbor Presses and Bench Type Arbor Presses made by this company. The "Man Saving" and "Built-In" features are shown detail by detail. Full specifications are given for the presses which run from bench type with capacity of ½-ton pressure to hand operated hydraulic arbor presses of 75-ton capacity. For your copy of "Hydraulic Arbor Presses" write K. R. Wilson, 8 Lock St., Buffalo, N. Y.

NEW MODEL 6500 UNIVERSAL VISE—A circular showing the advantages of this new drill jig body and both drilling and milling machine applications is ready for distribution. Operating instructions and price are given. For your copy ask for circular TD, when you write Mohr Lino-Saw Co., 122 North Union Ave., Chicago, Ill.

HYBCO TAP SHARPENERS—A Bulletin issued by Henry P. Boggis & Co., 412 West Lakeside Ave., Cleveland, O., gives complete information on the two sizes of Hybco Tap Sharpeners—the Series 400 for small taps (No. 4 to 1") and the Series 500 for the whole range of tap sizes (No. 4 to 5½"). Also illustrated in the Bulletin are the Model 500 Bench Grinder, Model 900 Tap Sharpening Fixture and Model 800 Tap Grinding Head. Ask for Hybco Bulletin.

GRAND RAPIDS HYDRAULIC FEED SURFACE GRINDERS—Bulletin GL-100 gives complete specifications and information on this pioneer line of hydraulic feed surface grinders. For your copy address Gallmeyer & Livingston Co., 304 Straight Ave., S. W., Grand Rapids, Mich.

COLONIAL BUSHINGS—Specification sheets and prices on this well-known line of drill jig bushings are yours for the asking. Quick delivery is now being quoted on most sizes. Address Colonial Bushings, Inc., 145 Jos. Campau St., Detroit, Mich.

New Majestic Internal Grinding Machine

Designed to meet the requirements of most tool room internal grinding operations.

Equipped with Parker spindle and motor. The nose of the hollow spindle is ground for use of collets—with outside threaded for adaptors and a face plate. Parker ball bearings and standard rotor and stator assure perfect balance for smooth spindle movement. Parker spindle is available in several sizes.

Work head is readily adjustable, with graduated base which swivels 90 degrees on each side of center for taper grinding. A three step V-belt pulley drives an intermediate three step pulley on adjustable countershaft, which, in turn, has a V-belt drive to the main spindle.

The Majestic Internal Grinder is furnished with two section type table, mounted diamond dresser, and coolant tank designed for filtering and equipped with a ⅛ HP motor driven centrifugal pump.

Write for new descriptive circular.

2946 Woodbridge St., E.
Detroit Michigan

MAJESTIC TOOL & MANUFACTURING CO.

JOHNSON Furnaces Soon Pay for Themselves By Saving on Gas Bills

Due to advanced engineering principles, Johnson Furnaces save up to 50% on gas bills, yet attain maximum temperatures more quickly.

JOHNSON No. 120 Hi-Speed Furnace

Offers you 2300° F in just 30 minutes! Gives clean, speedy heating of all types of steel. Pyrex glass window in front door permits watching operation without opening furnace. Temperature is easily regulated. A compact unit, requiring little floor space. ABSOLUTELY NO COLD SPOTS in this furnace. Equipped with G.E. motor and Johnson blower. No. 120 has firebox 7¾"x5"x13½", lined with heavy insulating refractory. Available in other sizes. Send for prices.

Our 40th ANNIVERSARY YEAR
JOHNSON GAS APPLIANCES FOR EVERY INDUSTRIAL PURPOSE

611 E Ave., N. W.,
Cedar Rapids, Iowa

FREE

New 20-page Johnson Gas Appliance Catalog, with many money-saving appliances. Write for yours.

JOHNSON GAS APPLIANCE CO.

Problems of Die Casting Die Design

(Continued from Page 26)

design; in many cases a method of trial and error must be resorted to for a practical solution. It is advisable, however, to place the gate so that the metal has the shortest possible path to travel to reach all parts of the castings. Deep parts of the impressions should be placed close to the gate with vents and overflows opposite. It is better to gate into thin sections which lead into a heavy section than to shoot directly into a heavy section. Gates should be kept off surfaces which are going to be highly finished, or possibly plated, as there is always a tendency for blowholes or porosity to appear when the gate is removed from the casting.

Vents are Essential

The design of the gate influences and may prescribe the position of sufficient vents and overflows (Fig. 6). Vents are necessary to allow air, which is replaced by the incoming metal, to escape. Trapped air causes blowholes in the casting and sometimes blisters on the surface of the casting. The speed of the incoming metal and obstructions in the flow of the metal causes air to be trapped in the moving stream. Deadend pockets in the impression also trap air.

Overflows are necessary to wash out oil which has to be applied for the lubrication of the die. In some designs overflows "draw" the metal in the direction of the overflow, which apparently reduces the resistance against the flow of the metal by allowing the air to escape more easily.

In this brief sketch it has been possible to mention many of the vital questions which are involved in the technique of die casting. Many other problems just as important have not even been touched upon. In a later article the interrelation of these problems especially as they control the design of the die casting itself will be presented in some detail. The cooperation that the die caster can give to the product designer in avoiding or overcoming some of the difficulties of design as they relate to the die casting process will be outlined.

We have always Specialized in the Design and Building of

Precision Gages and Dies

Fine Gage and Die Makers

Our organization has been trained for years in the exacting art of fine gage and die making.

Our facilities are among the best. Some of the largest users of precision gages, gaging fixtures and stamping dies have been our regular customers year after year.

We are again expanding our capacity to give the same standard of service to a larger number of companies, particularly those engaged in National Defense work.

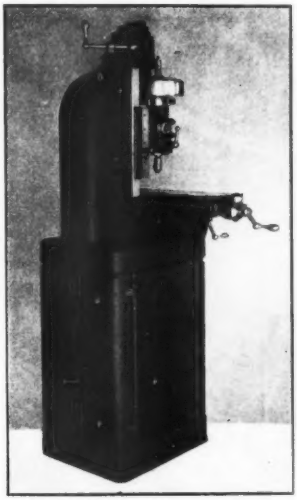
TOOLS & GAGES, INC.
3106 E. 63rd St. Cleveland, Ohio

May we quote on your requirements?

New Holland High Speed Vertical Milling Machine Placed on Market

MARBURG BROTHERS, Inc. of New York have just placed their new Holland high speed vertical milling machine on the market. The new mill, equipped with a swivel head, is especially designed for work on tools, dies, molds and accurate production work. High spindle speeds and rigid construction assure smooth finish and accurate work.

The Holland is an eight by sixteen mill—8-inch cross and vertical feed and 16-inch longitudinal hand feed. Seven speeds from 525 to 4000 rpm are provided through a driving pulley mounted on separate ball bearings. The high speed head is self contained and is graduated 90 degrees both ways so that it can be turned to any angle parallel with the longitudinal feed. The chromium plated quill is lever feed with depth stop graduated in thousandths.



The alloy steel, heat treated spindle is splined at the upper end for the pulley. The lower end is machined for No. 7 B&S taper. The spindle is mounted on ultra precision, pre-loaded ball bearings.

The column is full box type construction, cast solid with the knee. The head

(Continued on next Page)

Reg. U. S. Pat. Off.

UNBRAKO

Knurled

SOCKET HEAD CAP SCREWS

These cold-forged knurled heads—dry or oily—gear right to the fingers ... screws can be turned FARTHER and FASTER before applying wrench! No slip! No loss of time! And your men will like them, for every mechanic prefers to use his fingers instead of a wrench. Next time, be sure to specify "UNBRAKO"!

STANDARD
PRESSED STEEL CO.
Box 600, JENKINTOWN, PENNA.

Northern Ohio Group Holds Outing and Golf Party

THIRTY members and guests attended the First Annual Outing and Golf Party held by the Northern Ohio Division, Special Tool, Die and Machine Shop Institute, Thursday, June 19, at Sleepy Hollow Country Club. Entertainment included both cards and golf. Al Sommer, with competition from Emil Hahn, Fred Schmaltz and Harley Freeman, won the golf prize as the best of the Old Timers. Other golf prize winners were E. B. Bunell, H. Rueter, R. Kiffer, F. W. Denning and T. A. Barth. Dinner was served in the Club House. The Entertainment Committee (Tom Barth, Bob Danly, Bob Kiffer, J. R. Fitzsimmons, chairman) did such a good job that it was decided to make such a party an annual affair.

Holland Vertical Mill

(Continued from Page 53)

is mounted on the vertical slide, the bearings of which are up out of the way of chips and dust. Vertical table and cross slides are provided with hand scraped ways and fitted with heavy adjustable gibs. The cabinet base provides space for tools and accessories.

The feed screws are 8-pitch Acme thread and are mounted on angular contact ball bearings which are adjustable to eliminate end play. The two piece bronze feed screw nuts are adjustable for wear and are replaceable. Large, easily read feed dials are graduated in thousandths.

A new circular giving specifications and construction data on the new Holland HS Vertical Milling Machine is available. Write Marburg Bros., Inc., 88-92 West St., New York, N. Y.

"Die Designing and Estimating"

The material published separately in Charles Bohmer's "Die Designing" and George Dannes' "Die Estimating" is being revised, and, with approximately 40 percent new material, will be published in a single volume. The new book, to be called "Die Designing and Estimating", Revised Edition, will be ready for distribution in a few weeks.

Worn Gage Blocks Can Mean Rejections

Like all tools, gage blocks wear. Some shops may be relying on gage blocks that have lost their accuracy through use and wear. DON'T TAKE A CHANCE ON REJECTIONS, particularly with the close tolerances demanded today. ORDER THE ULTRA-CHEX INSPECTOSET.

The ULTRA-CHEX INSPECTOSET consists of 34 precision length standards which will make up almost 80,000 combinations in steps of .0001" from .300" to 8".

1st: One Ten Thousandth Series—nine blocks.
.1001" .1002" .1003" .1004" .1005" .1006" .1007" .1008" .1009"

2nd: One Thousand Series—nine blocks.
.101" .102" .103" .104" .105" .106" .107" .108" .109"

3rd: Ten Thousandth Series—nine blocks.
.110" .120" .130" .140" .150" .160" .170" .180" .190"

4th: One Hundred Thousandths Series—four blocks.
.100" .200" .300" .500"

5th: Inch Series—three blocks.
1.000" 2.000" 4.000"

The INSPECTOSET also includes an Optical Flat which is used for checking gage blocks, micrometer anvils and other lapped surfaces for parallelism and planeness.

Write Today for Price and Delivery

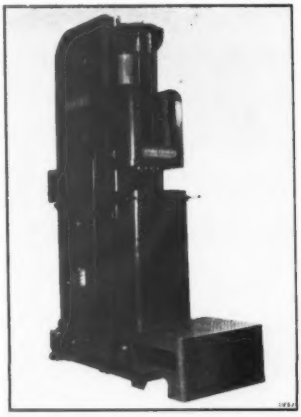
Geo. Scherr Co., Inc. 128-B Lafayette St. New York, N. Y.

Colonial Streamlines New Standard Pull-Up Broaching Machines

DEVELOPED primarily to obtain maximum production in machining round and splined holes, Colonial Broach Company is now offering a complete new standard line of improved Pull-Up Broaching Machines in "streamline" models ranging from 6 to 25 tons capacity and from 36 to 60-inch stroke. All machines provide completely automatic handling of the broach.

Peak capacities of the entire line of machines have been substantially increased over former types to provide greater reserve power and smoother operation when tooling is adapted for the normal capacities of the machines. The machine platen and puller brackets are usually large, providing ample space for pulling two or more broaches at one time. Provision is made for mounting spiral broach drive heads when mechanical means of rotating the broach is required to machine spiral splines.

Automatic handling of the broach is obtained through the use of a hydraulic handling mechanism. The operating cycle is as follows: The broach is held in the



bottom of the handling mechanism by locating bushings. When the operator

(Continued on next Page)

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THE ALLEN MANUFACTURING COMPANY
HARTFORD, CONNECTICUT, U. S. A.

Pull-Up Broaching Machines

(Continued from Page 55)

starts the machine, after placing the part in position over the pilot end of the broach, a handling cylinder located in the base of the machine advances the broach through the platen. An automatic puller located in the pull bracket then engages the broach. Loading and unloading the machine is easy, since the part is merely dropped over the top pilot of the broach. This, in combination with automatic handling of the broach, insures maximum production. The machines are equipped with dual hand control, making it impossible for the operator to start the broach unless both hands are on the operating levers.

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LLOYD L. LEE, formerly with Wilcox-Rich Division, Eaton Mfg. Co., has been elected vice-president of The Gordon-R-Co. of Royal Oak, Michigan, manufacturers of Plan-O-Mill thread and form milling machines. He will have charge of sales and engineering. Other officers of the company are G. R. Smith, president; J. H. Smith, treasurer; and Harold Norberg, secretary.

The company also announces the purchase of the manufacturing rights and business of the Plan-O-Mill Tool Corporation of New York. Offices of the company have been recently moved from the Marquette Building, Detroit, to enlarged quarters at 625 Washington Square Building, Royal Oak, Mich.

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HARRY McCOOL, Jr. has been appointed South Western Sales Representative for the Steel and Tube Division of The Timken Roller Bearing Co. His territory includes Kansas, Louisiana, Oklahoma, Arkansas and Texas, with headquarters at Dallas.

Mr. McCool joined Timken in 1928 as hot mill operator and was advanced to Superintendent of the Timken Tube Mill at Wooster, Ohio, in 1935. In March, 1941 he joined the Sales Department of the Steel and Tube Division.

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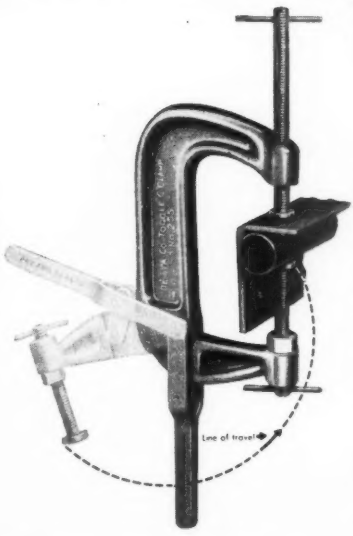

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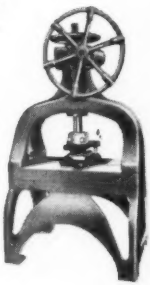

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Detroit Stamping Co., 344 Midland Ave., Detroit, Mich.

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Precision Spring Corp., 15400 Woodrow Wilson Ave., Detroit, Mich.

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Cullman Wheel Co., 1332 Altgeld St., Chicago, Ill.

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Davis Tool & Engineering Co., 19250 Plymouth Rd., Detroit, Mich.
Denning Mfg. Co., The, 1775-81 E. 87th St., Cleveland, Ohio.
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Federal Tool Corp., 400 N. Leavitt St., Chicago, Ill.
Knu-Vise, Incorporated, 16841 Hamilton Ave., Highland Park, Michigan.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, Ohio.
Variety Machine & Stamping Co., The, 12695 Elmwood Ave., Cleveland, Ohio.

STAMPS—Steel
AcromarK Company, The, 261 North Broad St., Elizabeth, N. J.

STEEL—Alloy
Columbia Tool Steel Co., 410 East 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1260-1264 West Fourth Street, Cleveland, Ohio.
Forging and Casting Corp., Ferndale (Detroit), Mich.
Jessop Steel Co., 610 Green St., Washington, Pa.
Ryerson & Son, Inc., Joseph T., Chicago, Ill.
Wheelock-Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Mass.

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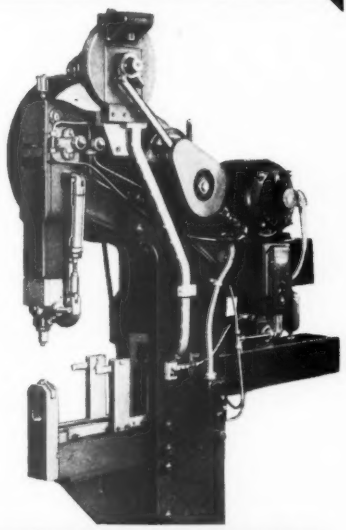
AUTOMATIC FEED
"RIVET-PIERCE"
RIVITOR
(the new "RK" machine)

The previously unpierced work is driven down over the underfed rivet, punching a slug out of the work. The rivet is then set at the next stroke of the machine.

Handles rivets of sizes up to .140 diameter x ¼" long unannealed solid steel rivets. These may be of any flat head type such as "coopers" or "tinners". The size mentioned above can be set in total maximum work thickness of .075.



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this is a **TOMKINS-JOHNSON** *product*

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Timken Roller Bearing Co., Steel and Tube Div., Canton, O.

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Ex-Cell-O Corporation, 1206 Oakman Blvd., Detroit, Mich.

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Foredom Electric Company, Dept. 226, 27 Park Place, New York, N. Y.
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Chicago Wheel and Mfg. Co., 1101 W. Monroe St., Dept. TD, Chicago, Ill.

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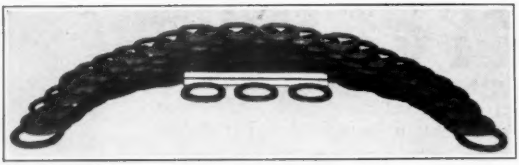

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More and more manufacturers are coming to realize the importance of smooth, truly flat surfaces where fluids must be sealed by moving parts.

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May we confer with you on your sealing problem?

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A Shop Aid

COMMERCIAL STANDARD FOR GAGE BLANKS REVISED—A revised standard for gage blanks has just been released by the National Bureau of Standards, Department of Commerce, under the title, "Gage Blanks (Third Edition), Commercial Standard CS8-41".

The revision incorporates new standards for thread setting plug gages, taper thread ring gages, dial indicators and master disks. Standard designs without complete dimensional specifications are proposed for spline plug and ring gages, taper plug and ring gages, flush-pin gages, built-up snap gages and flat plug gages. Adjustable length gages are completely revised and minor changes are incorporated in the standards for trilock handles, plain and thread ring gages in the smallest ranges, taper plug and ring gages for checking taper lock handles and gaging members, plain adjustable snap gages and twin ring gage blanks.

The revised standard is effective for new production from January 1, 1941, and for clearance of existing stocks on January 1, 1942. Copies are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 15 cents.

CUTS TOOLING TIME
SPEEDS PRODUCTION

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THE UNIVERSAL VISE

Loads and unloads with amazing speed—lever locks work instantly—holds securely—releases quickly. No complicated adjustments—no costly drill fixtures needed—just an inexpensive drill bushing plate and adaptor for each job. Sturdily constructed—nothing to get out of order. Quickly pays for itself. Only $29.75 f.o.b. Chicago. *Money Back Guarantee*

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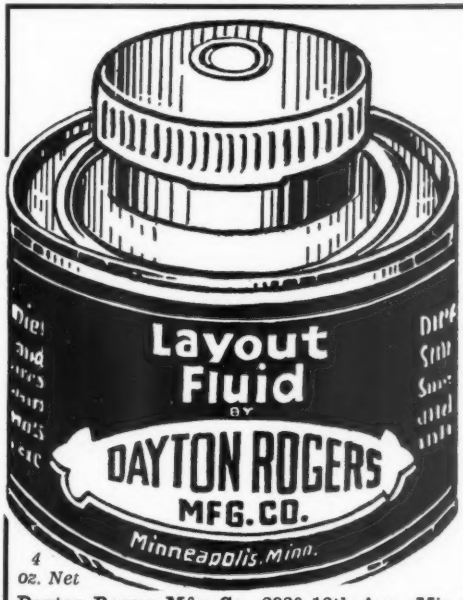

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For Machinists, Toolmakers, Diemakers, Model Makers, Template Makers and Layout Men—also for general machine shop and toolroom use on tools, dies, jigs and fixtures and machine surfaces, this Layout Fluid has a considerable advantage over the old copper sulphate method.

With the use of this Layout Fluid, you simply wipe the surface clean and brush it on. It dries instantly.

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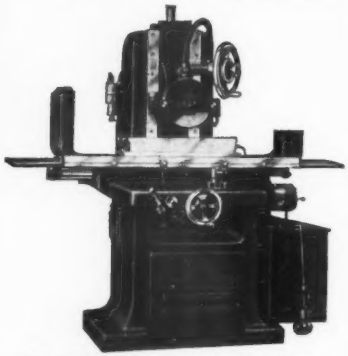

IN GRAND RAPIDS HYDRAULIC FEED SURFACE GRINDERS DESCRIBED IN
BULLETIN GL-100

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304 Straight Ave. S. W. Grand Rapids, Mich.

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SAVES AN AVERAGE OF $4.80 EACH HOUR IT'S USED

Inside and outside cuts on dies, shoes, templets and endless other jobs can be done in a small fraction of the time required by former methods. Saws, files, and polishes. A highly developed, large capacity machine which will enable you to do in minutes jobs which otherwise require hours. Get the complete facts.

Simply ask for DI-SAW Bulletin.

Built by Sawing Machinery Specialists

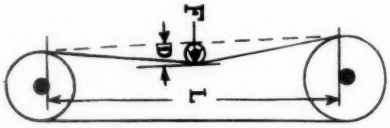
THE TANNEWITZ WORKS
GRAND RAPIDS - MICHIGAN

How to Determine Horse-Power to Drive any Belt-Driven Machine

THE following method will give a close approximation of the horse-power required to drive any belt operated machine in the tool or die shop. It makes no difference whether the belt is made of leather, rubber, canvas, hair, or any other substance. The method is also applicable to V-belts.

It is well known that if we find the simultaneous total tension on the tight side and on the slack side of a belt drive, and if we know the speed of the belt in feet per minute, it is a simple matter to calculate the actual horse-power being transmitted. To determine belt speed is easy. The unusual task is that of finding the belt tensions—a thing that *can* be done.

The accompanying sketch shows how belt tension can be determined not only when a machine is standing idle but when it is in motion.



Press a light idler pulley against the mid-point of the belt as indicated in the sketch until it deflects any convenient distance. Let us call the deflection D. Measure the force F in pounds required to produce the deflection and measure the distance deflected, D, in inches. Then measure the distance L between points of tangency on the pulleys as shown in the sketch, also in inches. For approximate computations this distance L can often be assumed to be the distance between shaft centers in inches. To determine the belt tension multiply the force F in pounds required to deflect the belt by the distance L in inches. Then multiply by 0.25. Divide that product by the deflection D in inches. The result is the tension in the belt in pounds.

Do the same with the slack side in precisely the same way. If possible, determine the tension in the slack side simultaneously with the determination of tension in the tight side. If determined simultaneously results will be more accurate.

Next subtract the tension in the slack

SHARPLY DEFINED Scribed Lines

Micro Supreme

LAY-OUT DYE

Manufactured by

MICHIGAN CHROME & CHEMICAL CO.

6350 E. Jefferson Ave., Detroit

Be Sure to Take Advantage of This Special

TRIAL OFFER

A handy five-ounce Combination Brush-in Can . . . ideal for shop use and for trial purposes . . . for only

60c

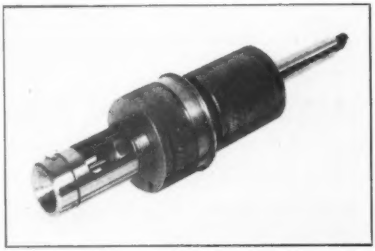
side from the tension in the tight side. The result is the so-called "effective pull" in pounds.

Finally, to determine the horse-power transmitted, multiply the effective pull in pounds by the velocity of the belt in feet per minute. Belt velocity can be determined by referring to tables which are commonly found in standard handbooks and catalogs. Lastly, divide that product by 33,000. The result is the horse-power transmitted to the machine.

Universal Engineering Brings Out New Centering Chuck

THE Universal Engineering Co., in Frankenmuth, Mich., have recently brought out a new tool known as a centering chuck which, it is claimed, makes a centering machine out of practically any medium sized drill press. Bushings are beveled at a 45° angle forming a conical surface that fits over the ends of shafts to be centered. Chucks are furnished with a set of collets and bushings to fit various size center drills. The cone locates the shaft centrally and the bushing guides the center drill.

A feed out adjustment on the chuck regulates the depth of the center drill so that centers will be uniform. It is only necessary to chamfer the burrs



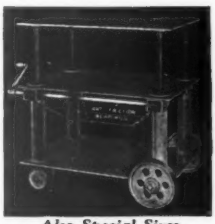
from the shaft to secure uniform centers with a few thousandths variation in depth. Work from screw machines that has been centered in one end, can be set on a drill press with a center point and the opposite end centered rapidly.

Literature on the new Universal Centering Chuck is now available for distribution. Address Universal Engineering Co., Dept. TD., Frankenmuth, Mich.

Move heavy dies, jigs and fixtures more quickly, economically and safely *with the*

HAMILTON PORTABLE ELEVATING TABLE

(Patented)



Eliminates costly mishaps and breakage . . . Is a labor saver because it requires only one man to handle . . . Levels and supports overhanging pieces of work . . . Safe — Indispensable — Inexpensive . . . Two standard sizes: 2,000 pounds and 5,000 pounds.

Write for circular and prices

THE HAMILTON TOOL COMPANY

Ninth and Hanover Streets Hamilton, Ohio

Also Special Sizes Up to 20 Ton Capacity

Remove
BROKEN TAPS
Quickly
Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.
Easily
Tap Extractor and Tap Wrench are only tools needed.
Safely
Threads are not damaged. Not necessary to tap oversize after broken tap is removed.
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RADIUS GAGES
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LUFKIN
Each blade is a separate unit, has five separate applications for its radius, and carries the corresponding external and internal forms.
LUFKIN
SAGINAW, MICHIGAN • New York City

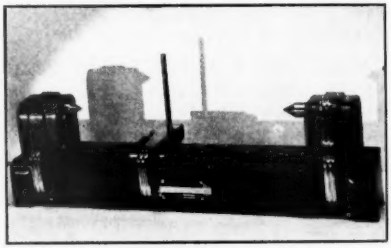
Barber-Colman Announces Improved Bench Center

THE new, improved Barber-Colman Bench Center for inspecting a wide variety of small work up to 6½" diameter by 18" long is announced by Barber-Colman Company, Rockford, Illinois.

This bench center provides a very accurate, fast method for inspecting cylindrical and circular pieces. It combines modern, streamlined appearance with improved speed of operation and accuracy, including such features as:

Quick-acting lever on the tail center which, when moved to the left, clamps the center; moved to the right unclamps and retracts center all in one motion. (Heavy work cannot force center back and destroy accuracy.)

Improved design of ways. All three sliding members locate from the same reference surfaces, insuring accurate sliding indicator base with relative location of centers at any point along the bed.



Design of ways and clamps insures free and quick sliding centers and indicator base when unclamped.

Quick-acting, powerful clamps hold indicator base and centers rigidly in position.

Large, sturdy center provides greater wearing surfaces in holes to preserve original accuracy throughout a long life.

The base is cast from nickel cast iron and is of well ribbed box construction with finished ways cast integral. Both headstock and tailstock are adjustable, and may be rigidly clamped at any position on the bed by quick-acting, powerful clamps. The tailstock has a spring-loaded, hardened and ground sliding center

(Continued on Page 68)

The hammer that pounds safely . . . . . .

Genuine Java Water Buffalo Hide is treated and compressed into long lasting, almost indestructible faces for these fine Chicago Rawhide Hammers with malleable iron heads. They have no equal for striking safe blows on surfaces that must not be marred.

MALLETS TOO . . .

Chicago Rawhide Hammers are available through your dealer in sizes and weights for every purpose.

• These tools with larger heads will not crack, break or mushroom. They give sound, accurate blows without defacing materials.

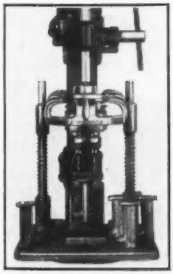
CHICAGO *Rawhide* MFG. CO.

1280 ELSTON AVE., ★ CHICAGO, ILLINOIS.

LINCO *Two Spindle* Adjustable Drill Head

Also Adaptable for Tapping

Drills two holes at once, made in several sizes, drill centers ½" to 6", speeds up to 3600 RPM, capacity drills 0" to ⅝". Total weight of small head, with aluminum gear case, only 9½ lbs. Equipped with roller and ball thrust bearings. Especially engineered for Canedy Otto, Demco No. 15 and similar drill presses—also suitable for use on larger drill presses.



Descriptive Bulletin *Sent on request*

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Machine & Tool Company
12250 Coyle Ave.
DETROIT, MICHIGAN

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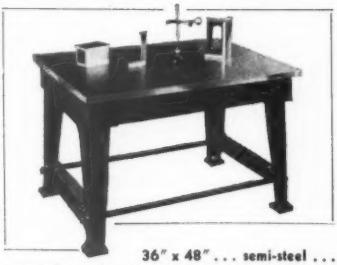

36" x 48" . . . semi-steel . . . accurately machined. Securely mounted cast legs are machined and provided with adjusting screws for perfect alignment. Shipping weight, 1250 lbs. Also larger or smaller plates with planed or scraped surface.

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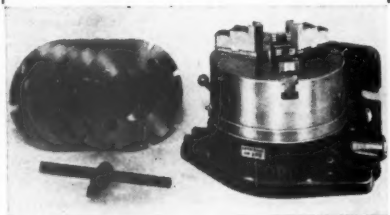
Defense Work Requires
MODERN ADAPTABILITY



The Hartford "Super-Spacer" is a superior spacing device adaptable for many tool room operations. It speeds work by reducing set-up time. It is equally adaptable to special work or for production.

THE HARTFORD SPECIAL MACHINERY CO.

281 Homestead Avenue
HARTFORD CONNECTICUT

New Barber-Coleman Bench Center

(Continued from Page 66)

which can be readily locked in position by moving the quick-acting lever to the left. When moved to the right, the lever unclamps and retracts the center, all in one motion. The headstock center is fixed and all three sliding members locate from the same reference surfaces, insuring accuracy. The slide, or indicator base, is provided with a vertical post and is used with a standard type indicator clamp. Other types of indicator holders can be easily attached if desired. The design of the ways and clamps insure free, quick, sliding action to the centers and indicator base when they are unclamped.

The purpose and use of this center is for inspecting cylindrical and circular pieces which are either held between centers or are mounted on arbors, as in the case of a gear or gear blank. The work is inspected usually by being rotated by hand under a dial indicator which registers the amount of runout or eccentricity. This method of inspection also shows any variations of the true circular form of the piece. In addition, work may be checked axially to determine side run out or "caming" action on the sides of shoulders or collars. There are many other purposes for which the bench center can be readily used, many of which will be evident upon consideration of the inspection work being done in each individual shop.

A new Bulletin, "Inspection Streamlined", giving specifications, price and full particulars of the use of the B-C Bench Center will be sent on request. Address Barber-Colman Co., Dept. TD, Rockford, Ill.

Timken Promotes Maratta

C. M. MARATTA, Maintenance Engineer for The Timken Roller Bearing Company since 1921, has been appointed Chief Works Engineer to fill the vacancy left through the death of W. C. Makley.

Walter F. Green, who has been with the Timken Engineering Department since 1935, becomes Assistant Works Engineer.

Putney L. Wright, with Timken since 1938, will be plant engineer.

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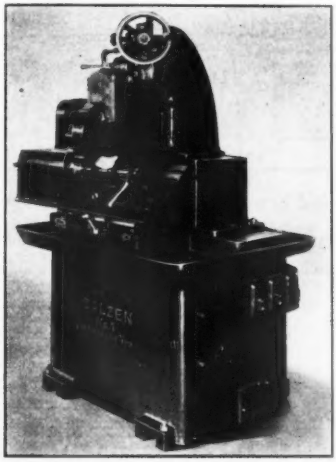
TOOL STEEL
TO CHICAGO USERS —
In the Chicago district, T. G. Dougall, District Sales Manager, with staff at 326 N. Western Avenue, offers users a wide operating and field experience.
Phone CANal 5353 for sales or service inquiries.
It pays to use Good Tool Steel.
COLUMBIA TOOL STEEL COMPANY

Dalzen Announces First Vertical Thread Grinder

A VERTICAL thread grinder, one of the first in the industry, has just made its appearance. It was developed and is now being manufactured by the Dalzen Tool & Manufacturing Company, Detroit, Mich.

It marks a departure from the conventional design of thread grinders. Instead of approaching the work from the side, the wheel does it from above. In this position the head is directly over its own base and a constant equilibrium is maintained. The weight is always down on the feed screw and a natural condition for maintaining size of work is thus insured.



Being in an upright position the Dalzen conserves on floor space. It has a capacity of 18 inches between centers, 6 inches in diameter, and can produce 10-inch length threads any place on the 18-inch shaft, right or left hand, with the same lead screw.

The head pivots and can be set accurately to a maximum of 25 degrees either side of center to produce right or left hand threads of any standard or special forms.

A cam arrangement having a master cam with an adjustable fulcrum block and pick-off gears provides for the making of variable relief on any number of flutes in taps.

(Continued on Page 72)

ARMSTRONG
SYSTEM of TOOL HOLDERS

A new Spring Tool for tough alloy steels.

The ARMSTRONG Spring Threading Tool simplifies turning and threading of tough alloy steels, soft "pully" brasses, and aluminum, because it will "duck" before it will "dig in". It saves not only cutter, and the work, but a lot of time as well, for it is really 2 tools in 1, can be made a rigid or spring ("gooseneck") tool; can start, carry through and complete many jobs otherwise requiring 1 or more tool changes. These new ARMSTRONG TOOL HOLDERS take standard square high speed steel cutters which they hold in 3 positions permitting the most advantageous approach to the work.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
340 N. Francisco Ave., Chicago, U.S.A.
Eastern Warehouse & Sales: 199 Lafayette Street, N. Y.

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Vertical Thread Grinder

(Continued from Page 69)

A new circular on the Dalzen Vertical Thread Grinder is now ready for distribution to the trade. Ask for circular T-1 when you write Dalzen Tool & Mfg. Co., Detroit, Mich.

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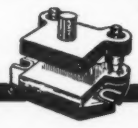

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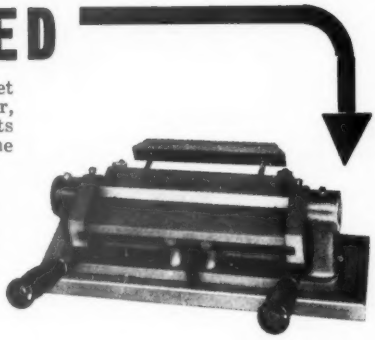

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"RIGHT AND WRONG OF HOB SHARPENING"—This booklet, prepared by Illinois Tool Works, is well illustrated and is sufficiently detailed to offer many valuable suggestions to the experienced shop man and acts as a practical guide for the apprentice or learner who wants to know the proper methods and equipment in the sharpening and use of hobs. A copy of "Right and Wrong of Hob Sharpening" may be obtained from Illinois Tool Works, 2503 N. Keeler Ave., Chicago, Ill.

"FIFTY HINTS FOR TEACHERS OF VOCATIONAL SUBJECTS"—This little book, covering some very important suggestions to shop instructors and to men who are in charge of apprentice training, is written by M. R. Bass, Director of the David Ranken Jr. School of Mechanical Trades, St. Louis, and formerly Assistant Director of the William Hood Dunwoody Industrial Institute, Minneapolis. The hints are based on a number of years of experience in teaching vocational subjects as well as supervision. We recommend it for all men who are engaged in any type of instruction, informal as well as formal. This book sells for 50 cents and can be purchased through The TOOL and DIE Journal.

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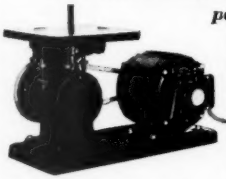

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Bulletin TDG-1 will be sent upon request to the manufacturer, All-Steel-Equip Co., Inc., Aurora, Ill.

"Getting the Most From Broaches"

The June issue of "Tool Tips", the house organ of Ex-Cell-O Corporation, has an excellent article on "Getting the Most from Broaches", by John A. Markstrum, Chief Engineer, Continental Tool Div., Ex-Cell-O Corp.

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A copy of Bulletin 26, "Universal Screwdriver", will be sent on request. For advice on the proper type of machine, production estimates, send samples of screwdriving assemblies. Address Detroit Power Screwdriver Co., 5385 Rohns Ave., Detroit, Mich.

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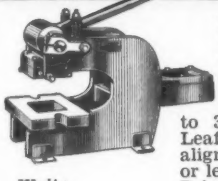

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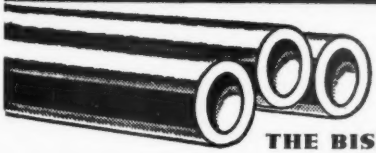

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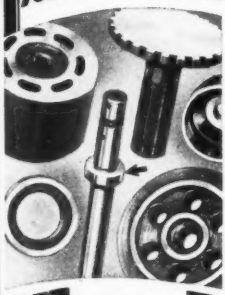

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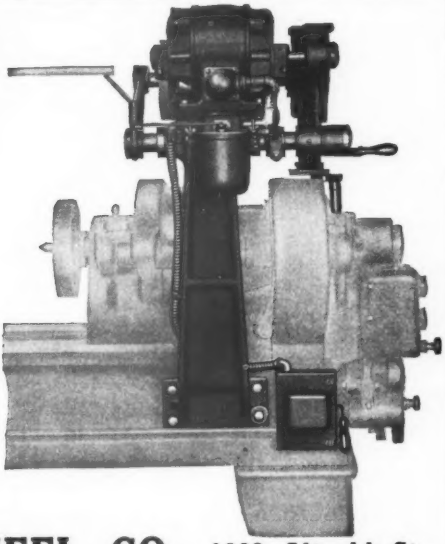

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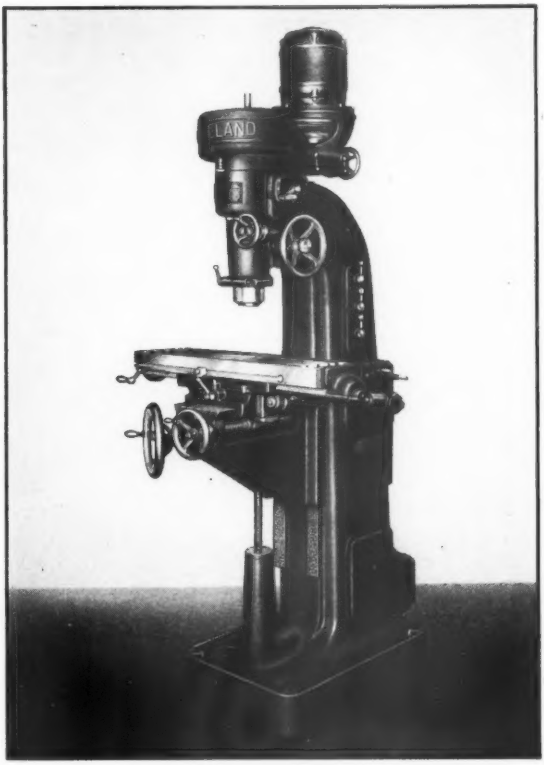

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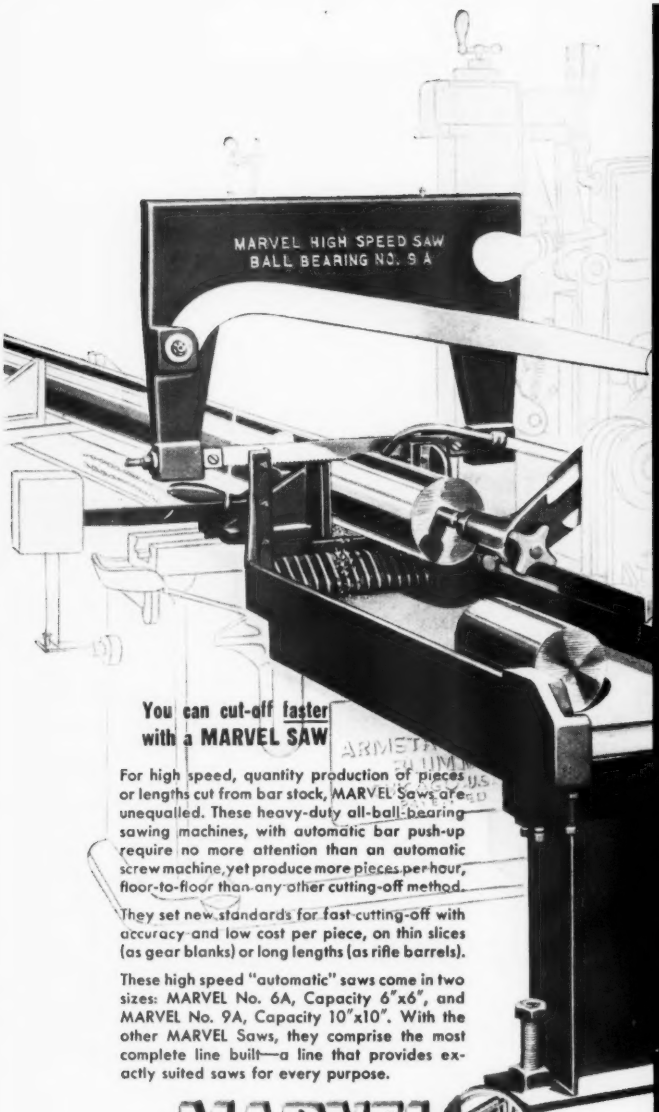

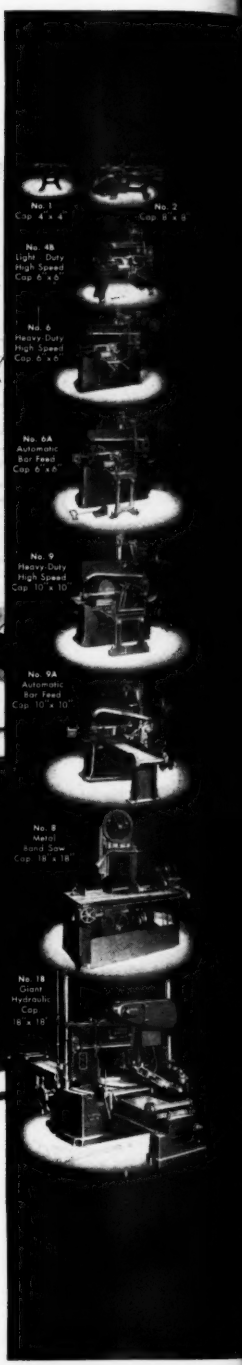

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MARVEL SAWS

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